UNITED STATES BANKRUPTCY COURT
FOR THE WESTERN DISTRICT OF NORTH CAROLINA
CHARLOTTE DIVISION

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| IN RE: | ) | |
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| GARLOCK SEALING TECHNOLOGIES LLC, et al, | ) | No. 10-BK-31607 |
| | ) | |
| Debtors. | ) | VOLUME III-A |
| | ) | MORNING SESSION |

TRANSCRIPT OF ESTIMATION TRIAL
BEFORE THE HONORABLE GEORGE R. HODGES
UNITED STATES BANKRUPTCY JUDGE
JULY 24, 2013

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I N D E X



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E X H I B I T S



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P R O C E E D I N G S

JULY 24, 2013, COURT CALLED TO ORDER 9:30 A.M.:

MORNING SESSION:

THE COURT: All right. We'll go back to where we were I guess.

MR. HARRIS: Thank you, Your Honor.

THE COURT: While he's coming up, somebody asked me the other day about having water in the courtroom, and I don't know if you all got the word, but that's fine, if you have bottles of water or whatever you want to bring in, you're welcome to it.

MR. CASSADA: We have them stashed under the table.

THE COURT: Okay. Good. I saw somebody with a cooler this morning and that reminded me. I may get me one too. If it was up to me we would be in blue jeans and T-shirts in here.

MR. CASSADA: That could be arranged.

THE COURT: All right.

LARRY R. LIUKONEN,

CONTINUED DIRECT EXAMINATION

BY MR. HARRIS:

Q. Good morning, Mr. Liukonen.

A. Good morning.

Q. I would like to pick up where we left off. I think we completed discussing the study that you had done for the

United States Navy in 1978. I want to return for just a second to the recommendations that you made. And in that opening paragraph there's that first sentence, "the recommended work practices and procedures are based on reducing asbestos exposures to gasket workers to below 0.1 fibers per cc;" is that right?

A. That's correct.

Q. And I believe you testified and as it indicates there, that was the trigger for medical surveillance in the Navy; is that correct?

A. That's correct.

Q. Okay. To put that in context for the court, I would like to ask you to explain this slide that we have. This appears to be a listing of the historical standards for asbestos exposure; is that correct?

A. That is correct.

MR. HARRIS: Your Honor, may Mr. Liukonen step down to walk us through this?

THE COURT: Sure.

BY MR. HARRIS:

Q. So Mr. Liukonen, the top entry and the first entry on the left is --

COURT CLERK: Excuse me, one second.

MR. HARRIS: Oh, sorry.

Q. So Mr. Liukonen, that top entry on the left references 30

fibers per cc; is that correct? Is that the standard -- or is that the measurement that's on the left hand side?
A. Yes. It's 30 fibers per cc. The recommended exposure level at the time was actually 5 million particles per cubic foot. There's not a direct conversion, but that's roughly equivalent to 30 fibers per cc.
Q. All right. It says there ACGIH. Can you tell us what that is?
A. Yes. That's a professional group that's called the American Conference of Governmental Industrial Hygienists. And they had a group of people that set what they called TLVs or threshold limit values. And this is one of the first ones that they set.
Q. All right. And that was in the 1940s?
A. That's correct.
Q. How long did that remain the recommended threshold limit value for asbestos exposure?
A. They didn't propose a new limit until 1968.
Q. Did you -- yesterday you explained the different sampling equipment to us. Today we're using a pump and a filter. I believe you mentioned yesterday there was an impinger that was used historically, correct?
A. That's correct. They used impinger. In the old days in 1946 they didn't have good battery operated pumps, would have used a hand crank pump to try to collect an air sample.

Q. The -- and then back in the 1940s it was 5 million particles per cubic foot. Millions of particles per cubic foot was the measurement for the impinger method?
A. That's correct.
Q. Then you indicated that in 1968 the ACGIH proposed a lower limit of 12 fibers per cc?
A. Yes. That's when the methodology was beginning to change. And actually they proposed a -- you could use either two limits, one was two million particles per cubic foot, or 12 fibers per cc.
Q. And that was how they proposed it; is that correct?
A. That's correct.
Q. And was that -- so that's the 6:1 inversion that you reference?
A. That's correct.
Q. Then there's a reference there to the Walsh Healey Act in 1969. Can you tell us what that is?
A. Yeah. That was for government contractors and they basically, they used the same level.
Q. Was it two million particles per cubic foot or 12 fibers per cc?
A. That's correct.
Q. Then 1971 OSHA. Can you tell us what that reference is?
A. OSHA came into existence in '71 and they adopted recommendations that were already available. And they adopted

the 12 fiber per cc or two million particles per cubic foot standard.

Q. All right. And then it looks like right away they lowered it to five fibers per cc?

A. Yes. Just a year later they lowered it to five.

Q. And then the next entry is 1976?

A. '76 it was dropped to two fibers per cc. These are all time weighted average standard.

Q. Over eight hours?

A. That's correct.

Q. Long term samples, right?

A. Yes. Yes.

Q. Then in 1978 we have the reference to your Navy study, and that was the standard two fibers per cc at that time?

A. That's correct.

Q. But you were trying to keep it down below .1 fibers per cc for medical monitoring; is that right?

A. That's correct.

Q. 1986 it appears that there was a lowering by OSHA?

A. Yes. They dropped it to .2, and it stayed there for eight more years. They went to .1, and it's been at .1 ever since.

Q. So OSHA in 1994 adopted the same limit that you were trying to meet when -- or you were meeting when you were making your recommendations for medical monitoring back in

1978?
A. That's correct.
Q. And at that point I believe you testified yesterday that the only recommendation for gasket removal and flange clean up was to put the scraps in a plastic bag?
A. That's correct. And that was not to control exposures, that was to deal with waste requirements in the Navy.
Q. All right. Mr. Liukonen, have you since studied gaskets since 1978?
A. Yes, I have.
Q. Have you been published in the peer-reviewed literature with respect to gasket operations?
A. I have.
Q. All right. Can you tell us about that?
A. Yes. Dr. Weir and I did a study involving the disassembly of a diesel engine. And it was a three-day project. And the mechanic just went about his normal duties and did the way he would normally do the work. We collected air samples during all of the operations involving gaskets during the entire disassembly, and we published the results in this paper.
Q. This is a little different application of what you were studying in the Navy; is that correct?
A. It is. This is the diesel engine as opposed to flanges.
Q. Were these compressed asbestos sheet gaskets that were

used?
A. Yes, they were.
Q. Are these photographs from your study?
A. Yes, they are.
Q. Can you walk us through what these photographs represent?
A. Sure. The first one on the left is -- shows you know, that's kind of like hand scraping. This one is stuck on pretty hard so he's using a hammer and chisel, trying to knock some of that gasket material off. That one happens to be a 65 percent asbestos gasket.

The second one at the top right is power buffing, that's using a wire wheel. Again, it's a 65 percent asbestos gasket chrysotile.

The last one was a 3M Scotch bright pad. These are pneumatic -- hand-held pneumatic grinders that they were using for these purposes, and he's buffing off the remaining gasket residue on that surface. That was a 70 percent asbestos gasket.

Q. Can you tell us what -- what type of results did you get?
A. In the entire study, there were 20 some samples, close to 29 samples, with some of those -- a couple of those were outside the samples. All were non-detectable, below the level of detection except one sample. Actually there were two by phase contrast when we look at all fibers.

Then we went the extra step and used electron microscopy

which defines the fibers; were the fibers we saw actually asbestos. On one sample, none of the fibers were asbestos. On the other samples, some of those were asbestos. So if you look at only the asbestos fibers, it comes out on the lower level. We only found a detectable level in the one sample.

Q. Let me ask you a little bit about what you talked about there. There's a method for analyzing the air samples that we talked about yesterday; is that correct?

A. Yes.

Q. What's the name of that method?

A. It's phase contrast microscopy. The current method is called NIOSH 7400.

Q. When you analyze an air sample that way, can you identify whether you're looking at asbestos fibers or other types of fibers?

A. You cannot. By definition you cannot distinguish between the fibers. You count anything that has the appearance of a fiber. Anything that's three times longer than it is wide, you count as a fiber.

Q. How -- what other types of fibers would be in the work environment?

A. A lot of what we find are clothing. I find a lot of samples I collect we find very low levels of fibers. But then -- when people are around. But then when we do the TEM, the electron microscopy on them, we find generally there's not

asbestos in there. So I think it's generally clothing fibers is what I run into.
Q. You mentioned this other term, "TEM".
A. Yes.
Q. What does TEM stand for?
A. Excuse me. That's transmission electron microscopy.
Q. Is there a method for analyzing air samples for asbestos that specified?
A. Yes. That's NIOSH 7402.
Q. And so you've actually -- in addition to doing the phase contrast microscopy under NIOSH 7400, did you do NIOSH 7402 analysis for some of the air samples?
A. We did on those that had detectable concentrations of asbestos, we went ahead and did 7402 electron microscopy.
Q. Okay. You said on the ones that had detectable levels of asbestos or fibers?
A. Excuse me, you're correct. Detectable levels of fibers.
Q. All right. So when there was a detectable level of fibers, you did this extra procedure?
A. Correct.
Q. We may hear later about committee experts doing -- conducting -- following methods in general accordance with the methods. Were you following it -- the methods in general accordance, or were you actually following the methods?
A. No. You follow the methods specifically.

Q. Is that common in industrial hygiene?
A. It's common in industrial hygienist. It's the only way that you know you can compare your results to someone else's results.
Q. All right. So how many samples had detectable levels of fibers?
A. Two.
Q. All right. And then you did the TEM analysis and what did you find?
A. We found that only one of those had any detectable levels of asbestos fibers.
Q. So we've put a statement here, "all but one sample were below the detection limit with respect to asbestos fibers"; is that correct?
A. That's correct.
Q. Mr. Liukonen, we projected here a slide that depicts the different studies. Can you tell us what this represents?
A. Yeah. This represents some of the operations that I looked at with the Navy, and some of the operations that other people have looked at in the peer-reviewed literature. Specifically regarding a gasket removal and flange clean up.
And these refer to samples that -- most of the studies that have been done refer to short term exposures, because that's typically the way gasket work is done, in short term exposures. This compares some of the other studies results to

our results.
Q. Oaky. Let's talk about that a little bit further. You said these are short term samples?
A. Yes.
Q. Because gasket operations. Can you explain that a little bit further to us?
A. Yeah. The typical person that is working with gaskets, the end user of gaskets has many other duties that they do. And the removal or replacement of the gasket is kind of an incidental thing that they do.
I think Mr. Shoemaker testified that a person would probably change, I believe the number he used was maybe 250, maybe 300 gaskets in a year, not all of which are sheet gaskets, not all of which contain asbestos.
Q. Now you mentioned Mr. Shoemaker, he's an expert for the committee in this case; is that correct?
A. That's correct.
Q. And he was the superintendent of pipefitters for some period of time in the '80s at the Norfolk Naval shipyard, is that your understanding?
A. Yes, it is.
Q. So these are intermittent or short term activities?
A. That's correct.
Q. And these are short term samples. Can you tell us about the Cheng paper, the Cheng and McDermott paper?

A. Yeah. The Cheng and McDermott paper was the first paper published in the peer-reviewed literature regarding end use of gaskets. And they looked at -- they did some operations -- it was actually kind of similar to the Navy study, because it's a real field study. There's no background samples. They had another sample like we did that came out of their files that they included in the study. And they did -- this shows the different operations they looked at. They looked at scraping and brushing, power sander, which is kind of an unusual operation. Scraping and brushing wet and removal wet.

Q. What do you mean about the power sander being an unusual operation?

A. This was a sample that they found in their files that they had done previously, and it was using a power sander on a flange. This is the only reference I've ever seen to anyone using a power sander on a flange. I've read literally hundreds of depositions that people say they worked with gaskets, no one has ever said they used a power sander. So it's an unusual piece of equipment to use for removing a gasket.

Q. All right. The scraping and wire brushing -- scraping and brushing samples. How does that compare with the work that you studied?

A. That's very similar.

Q. All right. Now the also had some samples where they

scraped and brushed using wet methods; is that correct?
A. They did.
Q. All right. Is that common?
A. No, that's very uncommon to use wet methods. I don't recall ever encountering anybody doing that. Certainly not in 1978 they never saw anybody doing that.
Q. Is wet method though a common practice with respect to controlling the asbestos exposures that's emerged?
A. Absolutely.
Q. Since the '70s?
A. Absolutely. It's a very common practice for thermal insulation, for friable insulation.
Q. All right. You also have an entry there called a Spence paper; is that correct?
A. Yes.
Q. They studied removal and they used wet methods as well?
A. They used wet methods; that's correct.
Q. The 2004 Liukonen. That's the paper we just discussed?
A. It is. I included that -- it's not flange removal, but I included that because it's one that I was involved in.
Q. All right. The last paper there is Boelter 2011. Can you tell us about Mr. Boelter's work with gaskets?
A. Yeah. He looked at a number of different gasket operations. He looked at removal of hand tools and with power tools, and you can see the range of his numbers there. They

were very, very low, well below acceptable levels.
Q. Okay. There is a -- we projected here in the orange on the right-hand side, we spoke about 1972 OSHA had a limit of five fibers per cc as an eight hour time weighted average. Can you tell us what this is?
A. This shows the exposure -- short term exposure limit, which is what you typically use for a gasket operation, because it's such a short term operation, and it was 10 fibers per cc.
Q. All right. And the current limit?
A. The current OSHA short term limit is one fiber per cc.
Q. Okay. And then all but the power sander sample appears to be below -- well below that; is that correct?
A. That's correct.
Q. All right. There's another paper in the published literature by Dr. Longo, the committee's expert. You're familiar with that?
A. I am.
Q. He got higher results?
A. Much higher.
Q. Okay. How did his results compare with all the other studies that you're familiar with that are in the peer-reviewed literature?
A. They're much, much higher. We're talking orders of magnitude higher. They're in the range of what you would

expect for uncontrolled friable thermal insulation work.
Q. Do you find Dr. Longo's published paper to be reliable?
A. No, I don't.
Q. Why not?
A. For a number of reasons. One is that he didn't look at operations that people normally do, and that's what industrial hygiene is all about. We care about what exposure people really have, instead of something that they might have. He didn't use appropriate tools. There's a number of sampling and quality control issues with his results.

The results are absolutely inconsistent with everybody else and with his own studies. You can see the wide range of results that he finds.

There's -- and one that really stands out to me is in the published paper, the level they reported for asbestos in their chamber before they began the study, exceeded the OSHA PEL. So there was either a real quality control problem or a contamination problem or both.
Q. Okay. Mr. Liukonen, you said that when you were with the Navy that you studied insulation exposure; is that correct?
A. Yes.
Q. And could you tell us the range in which you -- what you found?
A. Yeah. I was saying I think I indicated yesterday our goal really was to try and keep below two fibers per cc. And

if everybody did everything perfectly, we could do that. Unfortunately that's typically not what happened. We frequently measured 5, 10, 20, even 100, even 200 fibers per cc.

Q. This is in 1970 -- in the 1970s after controls have been instituted?

A. Unfortunately, yes.

Q. Okay. Come back to that. Is -- this was a document that was produced at the Roger Beckett deposition. He's a committee expert. Are you familiar with this document?

A. I am.

Q. How are you familiar with it?

A. I wrote it.

Q. How do you know you wrote it?

A. Because of the initials at the top. Right there you can see LRL:cp. That means I wrote it and Claira Par typed it.

Q. You knew Ms. Par?

A. Yes.

Q. She a secretary there?

A. She was a secretary for the Industrial Hygiene branch.

Q. Did her husband work at the shipyard?

A. He did. Her husband Ned Par was a shop 30 outside machinist.

Q. And would he have had the type of trade or worked in the type of trade in the shipyard that would have worked with

gaskets?
A. Yes, he would.
Q. So someone like her husband would be someone that you're doing the gasket study for to determine whether they needed medical monitoring?
A. That's correct.
Q. All right. So let's go back to the sheet and can you tell us what this is, what this represents?
A. This is a monthly report that we sent to the shipyard telling them the sorts of numbers that we had during friable asbestos insulation removal aboard ship. We refer to it as during rip out operations.

So we collected -- we had these samples and then we analyzed the samples. I probably also analyzed all these samples, or at least a portion of the samples, or at least did quality control on the samples as well.

Then you can see we have -- there's a range. Our lowest is, I believe, around one fiber per cc, and we go all the way up to in excess of 100 fibers per cc.
Q. And these are -- it looks like there's 102.6 fibers per cc collected in an engine room, 48 fibers per cc collected in an engine room; 97 fibers per cc collected in a fire room. Are these long term or short term samples?
A. These are fairly short term samples. Because a long term you couldn't even analyze it.

Q. And so if we were going to compare it to an OSHA limit at the time, would we compare it to the short term limit?
A. If that really -- that depends on the length of the sample, depends on the length of the operation. So it would depend on the length of the operations. It's entirely possible the operations went on for most of the day.
Q. Does this exceed the short term limits?
A. Oh, it's 10 times over the short term limit.
Q. And does it exceed the long term limit?
A. By a lot.
Q. I just want to clarify. It's signed by -- you said you wrote this but it's signed by the committee's expert Roger Beckett?
A. Yes. The way the Navy works, I would write something like that, Roger was authorized to sign something like that, and the memo actually says it's from the Commanding Officer Navy Regional Medical Center.
Q. I see. I want to go back. I skipped over something that we had spoken about before, and that -- there's a couple of other studies that appear in the literature that report eight hour time weighted average exposures from gasket operations; is that correct?
A. Yes. It's more difficult to do because it's a short term operation. So they had to assume a number of jobs that would be done a day.

Q. All right. The one on the bottom is from 2006 by Mangold. Do you know who he is?
A. Yes, I do.
Q. Can you tell us who he is?
A. Yeah. Carl Mangold was the head of the industrial hygiene group at Puget Sound Naval Shipyard before I got there. His predecessor was Dan Bessmer. Then Roger Beckett the committee expert was trained by Mr. Mangold. I think Mr. Beckett said it was the best training he could possibly get. Then Mr. Beckett had that job after that. So I had seen a lot of Carl's work at the shipyard because, you know, I followed him up.
Q. So what did Mr. Mangold study?
A. He studied work with valves. He obtained a number of valves from different Navy ships, and he reviewed lots of different operations. Part of what he did was really kind of step two of our study. He took the same operations we looked at, but put them in a clean environment with no background contamination to see what you would have. He also did some operations of actually aboard ship of removing the valve and removing the gasket in place. So he did a number of different operations.
Q. This slide is reflective of gasket removal and flange clean up. But he did other samples -- he collected other types -- sampled other operations as well?

A. He did. He looked at a lot of the same secondary manufacturing operations that we had looked at.
Q. And then Mr. Boelter, this is a different paper by Mr. Boelter on gasket work; is that correct?
A. It is.
Q. And he also studied removal?
A. He also studied removal. What he assumed was that the maximum someone could do was maybe clean 10 -- or excuse me, eight flanges per day, or basically one per hour, which is also what Mr. Mangold assumed in part of his work. That's probably a very high estimate for what people actually do. But using those assumptions, these are the range results that he found.
Q. Mr. Liukonen, do you understand that Carl Mangold and Mr. Boelter did those -- did their studies, those were funded by Garlock and Coltec respectively?
A. Yes.
Q. And you understand Mr. Mangold and Mr. Boelter have testified for Garlock in the past?
A. Yes.
Q. And Mr. Mangold is deceased now?
A. He is.
Q. Is there any problem in your mind of relying on those studies since they were paid for by either Garlock or Coltec?
A. I don't have a problem relying on those studies. I'm

very familiar with the work of both of those people. I've been on more than one project with Mr. Boelter. I've seen how he does his work. I certainly don't have any problem with his methods.

Q. Okay. Mr. Liukonen, I want to turn now -- wrap up. We've heard from -- we heard about Dr. Irving Selikoff. Can you tell us who he was?

A. If you're going to pick someone in the '60s and '70s who was the leading voice for hazards of asbestos, particularly with insulators, with thermal insulation would be Irving Selikoff.

Q. Could you tell us what he's noted for?

A. He did a lot of work with the insulators union, and was very outspoken in terms of the hazards of asbestos, particularly of friable thermal insulation.

Q. You're familiar with this book from 1978?

A. Yes, I am.

Q. Are you familiar with this quote, "High Temperature jointing and packing materials with asbestos fiber: Compressed Asbestos Fiber-no substitute heat resistance material, no health hazard in forms used in shipyard application."

A. Yes, I am.

Q. Is that the conclusion that you reached when you studied gaskets in 1978?

A. Yes, it is.
Q. Is that your opinion today?
A. It is for end users, certainly.
MR. HARRIS: Thank you, Mr. Liukonen.
Yes, Your Honor we pass the witness.
THE COURT: All right.

CROSS EXAMINATION

BY MR. GEORGE:
Q. Good morning, Mr. Liukonen.
A. Good morning.
Q. My name is Jonathan George. I don't believe I've had the pleasure of meeting you?
A. I don't remember that we've met.
Q. This isn't the first time that you've been in court, correct?
A. No, it's not.
Q. And in fact, this isn't the first time that you've been in court at the request of Garlock?
A. That's correct.
Q. You work for a company called Technical Safety and Health Consulting, Incorporated or Techcon, correct?
A. Yes.
Q. And you're part owner of that company?
A. Yes.
Q. You are a certified industrial hygienist?

A. I am.
Q. Your wife is the majority owner of the company, correct?
A. Correct. Her name is spelled wrong there but that's correct.
Q. She is not a certified industrial hygienist; is that correct?
A. That's correct.
Q. Is it accurate to say that you've been working with the asbestos companies since the late 1980s to -- or early 1990s?
A. I don't know what you mean by an asbestos company. I do a lot of work for people that either made or used asbestos-containing products, primarily gaskets.
Q. Okay. You never testified in deposition or trial for plaintiff, correct?
A. No, that's not correct.
Q. When is the last time that you testified at trial for a plaintiff?
A. I don't believe I've testified at trial for a plaintiff I have given depositions for plaintiffs.
Q. Okay. You've testified for Garlock on at least 10 occasions in court, correct?
A. I would say so.
Q. Okay. You've also testified for AW Chesterton, correct?
A. I have.
Q. They're a gasket manufacturer?

A. Yes.
Q. You've testified for Worthington Pumps and Aurora Pumps. They're both companies that made pieces of steel that incorporated asbestos gaskets, correct?
A. I've done some work for them. I don't recall deposition. I don't recall trial testimony, but I'll take your word for it.
Q. You've also testified for railroads, correct?
A. Yes.
Q. Burlington, Northern, Conrail, CSX, Union Pacific, Norfolk Southern, Southern Pacific. And in that capacity there were at certain times testifying about asbestos that was used in railroads, correct?
A. Sometimes.
Q. You've also testified for General Motors, correct?
A. I've done some work for them. Again, I don't remember testifying for them, I may have.
Q. Since 1987 you've given testimony on behalf of asbestos defendants or companies that made or sold asbestos products, in New Jersey, Pennsylvania, West Virgina, Georgia, Florida, Tennessee, Alabama, Texas, Ohio, California, North Carolina, Montana and Minnesota, correct?
A. No, I don't think so. The way you stated it -- you phrased it, it was for people who made or sold asbestos products. I don't think that's correct. I think most of

those were probably railroads. Some of those are correct.
Q. Made and sold or used asbestos products, would that be more accurate?
A. Then the answer is, yes.
Q. Okay. Now you charged $300 an hour for your consulting and reports, correct?
A. Correct.
Q. And $400 an hour for your testimony?
A. Correct.
Q. And you spent around 27 hours on this case, correct?
A. Probably more by now.
Q. How much do you think by now?
A. I don't know. I came in, I believe, on Sunday.
Q. Now what you testified before on direct is pretty much what you've been testifying for every time that you've come into court on behalf of Garlock, correct?
A. Absolutely.
Q. This is -- there's nothing new that you presented today that you haven't presented in the last 10 to 15 years testifying on behalf of gasket manufacturers, correct?
A. No, I don't think so.
Q. Okay. I am correct?
A. I think you're correct.
Q. Okay. Now, you had two publications we talked about them. One was on diesel fumes, the other one was on asbestos

exposure from gaskets during the disassembly of a medium duty diesel engine. I think we talked about that a little bit on direct. What you didn't tell the court was that study was funded in part by a diesel engine manufacturer who elected not to be identified in your paper, correct?

A. Correct. They funded the air sampling and the initial report. They were not involved or -- and didn't fund any of the publication of the paper.

Q. Now you showed some of the pictures from your publication but you didn't show all of them?

A. No, that's correct, didn't.

Q. These are some of the gaskets that you were evaluating, right?

A. Yes.

Q. Some of them are really very small gaskets. The ones on the upper left-hand corner?

A. Yes. There are some very small gaskets. There were some that are significantly larger.

Q. The oil pan gasket, I think we can see a little bit of glistening down here, that's because the oil pan gasket is in a place where there's oil, correct?

A. That's correct.

Q. That oil would affect how much asbestos is generated when you take that gasket off, correct?

A. We didn't find that made any difference.

Q. Well that's because you didn't find any asbestos at all, so you wouldn't know whether it made a difference or not, correct?
A. That's correct. You can't get less than nothing.
Q. And then on the right you did a power wire brushing of some flange that's basically the size of the head of the brush you were using, correct?
A. That's correct.
Q. Now none of these are comparable to a flange gasket, correct?
A. What do you mean by that? I think they are comparable. I think the content is comparable. I think the composition is comparable. I think the size is generally smaller on most of these, but I don't think size makes any difference at all.
Q. Well size would make difference because that would have -- it would take less time to remove a smaller gasket, and therefore less opportunity for any asbestos that's in that gasket getting trained into the environment, correct?
A. That's correct. This particular individual certainly didn't stop and clear the air after he removed one gasket before he moved on to next one.
Q. But some of the gaskets in the Navy are the size of an entire diesel engine, correct?
A. That's correct. I've seen data on gaskets so large takes two days to remove the gasket.

Q. So these aren't comparable in that respect?
A. They're not comparable in that respect. They're comparable in terms of the air levels produced, not in terms of the size of a gasket.
Q. Did you ever see anybody in the Navy take a razor blade and take the gasket off by hand with a razor blade?
A. No. That's an unusual technique.
Q. Okay. Now let me -- I just want to ask you this question. You've seen that aboard ships, correct?
A. I've seen things very similar aboard ship.
Q. Is there any way for you to tell me who made any of the products that are contained on those pipes?
A. No.
Q. Can you tell me who made the cloth or who made the cement or who made the portable pads or who made the pipe covering if it's depicted like that on a Navy ship?
A. No.
Q. Let's talk a little bit about your study, it's not peer reviewed, correct?
A. That's correct.
Q. You've never submitted it for publication, correct?
A. That's correct.
Q. And you agree that you're not an expert on where gaskets are used or how they were used, correct?
A. Correct. I'm industrial hygiene expert.

Q. Now one of the things you didn't talk about -- I guess you talked about generally -- but in your paper you describe three methods that were used during your evaluation that you call controls, correct, control definitions?
A. Correct.
Q. This is verbatim from your paper. There are various types of asbestos gasket materials were used during the survey. Then you have the types of materials were in appendix. Controls for the various operations were defined and characterized under the following definition.
So your first definition is when there was no controls. That means there was no wetting, no enclosing or no ventilation, correct?
A. That's correct.
Q. Your second one is when there was housekeeping. And you define -- your report defines housekeeping as high efficiency vacuum cleaners, portovacs used to clean areas, waste material placed in sealed containers, areas kept clean and free of debris accumulation, stored materials sealed in impermeable polyurethane bags, correct?
A. Polyethylene bags, yes. Those are examples of housekeeping. Not an all inclusive definition, but those are example of things that we might have used.
Q. This is what the paper says. There is nothing else in the paper that defines housekeeping, correct?

A. That's correct. You have to go to recommendations to see what we recommended.
Q. But we'll see when we look at the testing, and it says housekeeping. It doesn't say anything other than housekeeping. So the reader of your paper, to understand what you mean by housekeeping would go to this definition, correct?
A. Or he could go to the recommendations and see what specific recommendations were made.
Q. And then there's ventilation. And the ventilation was for machinery operation that you talked about yesterday, correct?
A. Correct.
Q. Now one of the tests that you did was hand punching. This is what you mean by hand punching, correct?
A. This is one of those secondary manufacturing operations.
Q. Now one thing I noticed about this, this isn't the guy that you actually tested, correct?
A. That is the guy we tested.
Q. Where is his lapel --
A. We didn't necessarily take the picture during the test.
Q. Oh, okay. So there is no monitoring device on this individual, correct?
A. That's correct.
Q. Now he was wearing a mask while he did that hand punching, correct?

A. That's correct.
Q. And that's what you would recommend nowadays if you're doing hand punching --
A. That's correct.
Q. -- in fact what Garlock recommends in their MSDS sheets is if you're going to do this type of activity, you need to wear a face protection?
A. I think if you're doing it as a secondary manufacturing operation, that I would recommend protective equipment or some sort of controls. I don't think it's at all necessary for end user applications, which is what we recommended.
Q. And all he's doing is taking a punch on a sheet gasket and hammering down and knocking out the bolt holes on that gasket, correct?
A. All day, every day.
Q. And doing that with no controls, the range you found in a previous study was three fibers per cc, correct?
A. Correct.
Q. And then when you had housekeeping, that dropped down to 0.5 to 0.15, correct?
A. Yes.
Q. So the housekeeping had an effect on how much dust was generated by that individual?
A. It had a huge effect. I don't know if it was all dust generated by him, or it was a function of where he was in the

facility. But certainly housekeeping had a very large effect.
Q. And my question about that is, as a industrial hygienist when you're doing this air sampling, don't you normally take background samples to understand the environment that you're testing?
A. In 1978, never. Even today, rarely. As industrial hygienists if we make a mistake, we want it to be made on the side of the worker. So generally we don't separate out background levels.
Q. So during any of this study you never took a sample before the operation started just to see how much dust was in the environment before you actually started, correct?
A. That's correct. We never did. We went in there as worker protection. Had no idea this would ever show up in litigation.
Q. The next -- well, not necessarily for litigation purposes. Wouldn't you want to know whether what you're measuring is coming from the operation you're studying, or whether it's a function of something's in the environment before you actually started?
A. In 1978 that was not a consideration. We were only considered in what is this person's total exposure.
Q. Now for hand shaping, basically all the individual did is took a scribe or a pocketknife or scissors and cut the sheet gasket?

A. Right. This is the sort of thing a end user would do when he needed a gasket or two.
Q. And you did 10 samples of that, correct?
A. Yes.
Q. We don't know where that happened because you didn't say in this chart where those 10 samples came from, correct?
A. No. Those were shipboard samples not specified in this right here, no.
Q. But the only way I know or anybody else reading this study would know those are shipboard samples is because you're telling us that. There's nothing in this paper where you have a chart that said we did samples A, B, and C in the shop, C, D, and E and there, correct?
A. That's correct. You have to ask the author.
Q. And we have no picture of what representation of what the hand shaping was, correct?
A. That's correct. You won't find any pictures aboard ship.
Q. And just by using, with no controls, a pocketknife, you can generate an average of 0.13 fibers per cc, correct?
A. That's correct. Again, you don't know the source of all of that dust. And you don't know it was all asbestos, but that's what we reported.
Q. Then you did this machine shearing. Now only point about the machine shearing, I understand that's a mechanized event. But with no controls it's 0.5 to 1.3. Then when you just put

housekeeping in, not ventilation -- just housekeeping like we talked about what housekeeping means -- the level of dust dropped 10 fold, correct?

A. Yes.

Q. Okay. So there's something about that housekeeping which would cause the amount of dust being generated in the air to drop by a magnitude, correct?

A. Well -- oh, yes. You got to realize this is done in a shipyard. We used literally tons of asbestos-containing materials, had for years. A thorough cleaning of the facility is probably not something happens very often and certainly made a difference.

Q. So are you saying that when they did it without housekeeping, somebody came in and cleaned everything up and then you started doing it again?

A. Yes. Those are collected several different times.

Q. Now I thought I understood -- this is a picture of the machine that was doing this machine shearing, correct?

A. Yes.

Q. Now, is it your testimony that -- for the purpose of this test alone, somebody went out, got a rope, bought a sign, got an air fed respirator and gave it to the guy just so he can do it for this testing, never did that before; is that your testimony?

A. I don't know if he ever did that before or not. He

certainly did it for this test. He didn't have to go buy anything, he went to the tool room and picked up this equipment.

Q. And is it your testimony they never did that before?

A. I don't know if he ever did it before. I never saw it in any other applications involving gaskets.

Q. But you can't say that this setup was designed solely for this test, correct?

A. No, I can't say that.

Q. Okay. Then you had the machine nibbling. Again, the housekeeping in this case really didn't do much to change it. But that might be a factor, the fact that you only had two samples with no controls, and eight samples with controls, correct?

A. That's entirely possible.

Q. Again, he's wearing a full face respirator, right?

A. Same person that's right adjacent to the other machine.

Q. And this is not when he was being tested, because again, there's no lapel collector like you talked about?

A. That's correct.

Q. You can't say that he threw on this face mask just for this test, can you?

A. No. I don't know if that was his common practice or not. I just know that he was wearing it for this test. It was not something required but he did wear it.

Q. But it's certainly smart of him to wear that, because you would agree that's an appropriate thing if you're spending all day cutting gaskets with a machine?
A. I think for certain machine operations I would recommend some sort of controls. That's probably more controls than he needed. But I have no problem with using more controls than are needed.
Q. Now in your experience at the shipyard, there were occasions where the sailors -- not the sailors -- the shipyard workers would make gaskets themselves?
A. Yes.
Q. And you knew that that was a practice in the Navy when they're out at sea, you don't have somebody like this you can go to and say I need a piece of material. They've got to make their own gaskets, correct?
A. Often, yes.
Q. And one of the things you didn't study, didn't get level of dust from is a Navy person taking one of those sheets, putting it on a flange, taking a hammer, punching out the bolt holes and then taking shears and cutting around the gasket for the outside circumference. And then punching the middle out with a hammer and cutting the inside circumference. That's something you didn't test?
A. That's true. We did not have the shipyard produce anything that was not a normal operation. I recognize that's

done in other places sometimes, other people have tested that. We did not have them in the shipyard do anything unusual.
Q. But that's not unusual for sailors who are in the maintenance department on ship to have to do that, correct?
A. It's much more likely for them to do it. Other people have studied it, like I said, but we did not.
Q. Now this was supposed to be -- this picture behind it says that this is a installed gasket. That's not what that is, correct?
A. No, it is an installed gasket. It's just not a flange gasket. What this -- when we finished the study, we realized that we had missed a picture of an installed gasket. Like I said, most of those are aboard ship. Difficult to get a photographer aboard ship. Went down to the shop. We happened to find this one. This is actually a bracket for them to hook the pieces of equipment on while they work on it. So it's an installed gasket, but it's not a flange gasket.
Q. What's on the bottom there? That's a flange gasket, correct?
A. Pardon me.
Q. What's on the floor?
A. What's that?
Q. The material that's right down there?
A. You asked if that's what?
Q. That looks like a gasket that would fit in one of these

holes?
A. I don't think so. I don't know what that is.
Q. So you're saying this thing -- what was this used for?
A. It's a bracket.
Q. Okay. Certainly not -- it was something that was aboard ship?
A. No, I didn't say that. I said that we didn't have -- when we finished, we realized we didn't have a picture of an installed gasket. Difficult, if not impossible to get a photographer aboard a Navy ship. So we went down into the shop to where we could get pictures. This was the only installed gasket we ran across which is not on a flange, but it's on a bracket that's used for holding equipment while they work on it.
Q. So this was basically a large sheet of Garlock material that somebody punched holes in to match the holes of the bracket it's attached to?
A. Yes.
Q. You didn't measure how much dust was generated when that operation happened, correct?
A. Did not.
Q. Now we're talking about clean up following removal. This -- and you can't really see it because something's wrong with this. But this was only four samples, correct?
A. I don't -- yeah, I believe that's what it says. Yes.

Q. And there were no controls. Now, one thing you didn't do, and that's the removal -- first of all, that's not something that's aboard ship, correct?
A. This particular flange, I suspect this was taken aboard -- in a shop. Again, because we don't have shipboard pictures. Also it's on a pallet. So it's probably loaded on a pallet and taken to the shop for some additional work.
Q. Now this is not the removal that generated no detectable asbestos. You didn't measure how much dust was generated when somebody had to scrape all of that residual asbestos off that flange, correct?
A. Not that particular flange, I can't confirm we tested that, but we did test that sort of removal. If you go back to that previous slide, that's what it's talking about.
Q. Is it your testimony that there were no pictures ever taken in any shipyards during the '60s and '70s?
A. No, I don't think I said that. I think there were pictures taken in shipyards. Obviously we have pictures in shipyards. But it was difficult to get photographers aboard ship. At the time that I was in Bremerton we were working on nuclear ships, and they were enforcing very strict controls about who could go where, and cameras, and that sort of thing. We don't have any -- in this study we don't have any shipboard pictures.
Q. Did you ask them, I'm bringing a photographer along. I'm

doing this very important study to try and document how much dust is generated when we do these gasket operations and pictures would be very helpful?

A. I don't recall that conversation.

Q. You do agree though, that what the Navy required on a flange like this, that in order to install the new gasket, that surface there had to be pristine, had to be as smooth as possible, correct?

A. Again, I'm not a machinist. I'm not an expert in that sort of thing, but that's my understanding, that had to be removed. They don't want a leak.

Q. Sure. If you have any residual debris on that, when you put the new gasket on, you're not going to get the proper seal. And if you have steam running through at 1,800 degrees, you're going to cause -- a leak and other problems, correct?

A. That's what my understanding.

MR. HARRIS: Objection, Your Honor, to the extent that his question is trying to impose or suggest that 1,800-degree steam would be running through a line where compressed sheet gasket would be used. There's no evidence to suggest that's even possible.

THE COURT: All right. I understand the example. Go ahead.

BY MR. GEORGE:

Q. In your experience, you have seen individuals trying to

get that type of debris off of a flange, not only with a hand scraper, but also with power tools, correct? Pneumatic sanders and other type of mechanized devices to clean the surface of that?

A. I have seen power tools. And if you go to those pages we'll talk about those. But I have never seen a power sander.

Q. You've seen power wire brushes?

A. I have seen power wire brushes. I showed you pictures of them.

Q. You've seen power wire brushes on flanges that had compressed sheet gaskets, correct?

A. Yes, I did. We've tested that.

Q. And a power wire brush isn't going to destroy the metal of the flange is it?

A. That's beyond my ability to explain that. I'm an industrial hygienist.

Q. And in your industrial hygiene experience, you've seen people using power wire brushes on flanges that use sheet gaskets and they weren't worried about whether it was going to destroy the metal, correct?

A. I didn't ask them if they were worried about destroying the metal. I've certainly seen them use power wire brushes, I've tested it.

Q. Now one thing that you didn't do is, you didn't do a bulk analysis on any of the gaskets you took out to see if in fact

they were asbestos-containing gaskets, correct?
A. We did not do a bulk analysis on anything. Didn't do a bulk analysis on those that -- during secondary manufacture or anything. We relied on the shipyards, on specifications of the gasket material. We did not have the capability to do bulk analysis, so there was none done.
Q. And you know that they used non-asbestos gaskets on ships as well as asbestos-containing gaskets, correct?
A. Yes.
Q. And if you're scraping off a gasket that doesn't have any asbestos in it, then you're not going to detect any asbestos in the air, correct?
A. That's correct.
Q. Okay. You also don't know how much asbestos was in any gasket that you removed, correct?
A. That's correct.
Q. And you know that there's varying levels of asbestos, depending on what the gasket is, how big it is, what type of material it was used in, correct?
A. Yes.
Q. And so if you have a gasket that has less content, then you're going to generate less airborne asbestos when you remove it through manipulation, either hand or by machine, correct?
A. I don't know. The study Dr. Weir and I did, we didn't

find any difference. We couldn't detect any asbestos in the air regardless of how much was in the gasket.
Q. Right. So if you're not finding anything, that doesn't really give you the answer to the question if I have a 70 percent versus a 40 percent, whether there's going to be asbestos in the air?
A. I can't go less than nothing.
Q. Now, in your personal experience, in your peer-reviewed literature, the only gaskets in your peer-reviewed literature you ever tested were on an engine block, correct?
A. Correct.
Q. You never tested flanges to see how much dust is generated when I do a 70-percent gasket on a flange or a 10-percent gasket on a flange, correct?
A. I have not done that.
Q. Okay. And we have no information where those four samples came from. We just know that there was four samples.
A. Is that a question?
Q. Yes.
A. I can't tell you the ship or anything where those were taken.
Q. And you mentioned, I think, during your direct, the fact that there was an aircraft carrier that was being overhauled. It's not your testimony that all these tests were done aboard that aircraft carrier?

A. No.
Q. You don't know if any of the tests were done aboard that aircraft carrier?
A. No I don't know specifically which ship they were aboard.
Q. Then you did removal with simultaneous clean up, hand scraping with no controls, and you generated over 14 samples, an average of 0.13 fibers per cc, correct?
A. Yes.
Q. Again, you don't know whether any of those -- what the level of asbestos was in any of those gaskets and we don't know where the work was actually performed, correct?
A. Yes.
Q. We don't know the size of any of the flanges that the gaskets came off of?
A. Correct.
Q. Would you agree with me that size matters at least in terms of dose generated by an activity like scrapping a gasket off?
A. No.
Q. So you say that the same amount of dust is going to be generated in the breathing zone of a worker who's working on a 6-inch pipe, as one who is working on a 2-foot pipe and he's doing it for the time it takes to do that bigger pipe?
A. We're talking about the non-detectable levels. I have reviewed data. I've collected on gasket removals so large it

took two days to remove the gasket, it was still non-detectable.

So, you know, as you get -- how low can you go? Our method only allows us to go so low. I can't get low enough to answer your question.

Q. Well, these aren't non-detectable, because you have an average of 0.13. You detected something in the air, correct?

A. That's correct. And aboard ship I would expect we would.

Q. Removal and wire brushing using housekeeping. Now let me ask you this, would you agree with me that the manual removal of a gasket would generate less airborne asbestos than the mechanized removal of that same gasket?

A. That's a good theory. I'm not sure -- I'm not sure the data supports that.

Q. You don't have any data because you never tested those two, correct, other than what you did in this report?

A. That's correct. It didn't turn out that way here.

Q. Well, here you have no controls in one situation, and you have housekeeping on the other situation, correct?

A. But the control is picking up the debris and putting it in a plastic bag. That does not reduce the air concentration.

Q. Now that's your definition of what the housekeeping was, correct?

A. As the author, that is my definition.

Q. In your paper you didn't say housekeeping means simply

putting in a plastic bag, did you?
A. That's correct.
Q. In fact, when I looked at the definition of housekeeping, there's a lot of other things included the use of a port-a-vac, correct?
A. That's correct. And had we tested that way, we would have put those in the recommendation section.
MR. HARRIS: Your Honor, I object to the question. It's disingenuous to suggest that there's something else going on on housekeeping. The committee's own expert Mr. Roger Beckett testified exactly to what Mr. Liukonen testified to. The only housekeeping measure was putting the scrap in a plastic bag with respect to the end-user activities.
MR. GEORGE: Respectfully that's argument and not an objection.
THE COURT: We'll proceed.
BY MR. GEORGE:
Q. Let's look at your summary. You said that airborne fiber concentrations produced in all phases of the hand operations were quite low.
What that means is, there was some asbestos generated in every one of those hand operations, correct?
A. Well, actually there wasn't. There was -- there were some that were non-detectable in all samples. There were some detectable fibers, whether they were from the gasket

operation, we don't know. Whether they were actually asbestos fibers, we don't know.
Q. That's because you didn't go the step further and actually evaluate what was in your air samples by a more sophisticated microscopy technique?
A. That's correct. If that methodology was available in those days, we certainly didn't have access to it.
Q. Did the shipyard keep your filters that you got from your counts?
A. The shipyard never had the filters, and I would be very surprised if they still exist after all these years.
Q. Who would have retained custody of those?
A. Well, there were three laboratories that did the analysis. I don't believe we ever requested the filters be returned to us. So there were three labs did the analysis, we did some. And the Navy's Environmental Health Center did some. There was another lab in Richmond, Washington did some. So I would suspect that none of the filters exist anymore.
Q. Well, you suspect that. But you've been testifying now for 15 years on behalf of Garlock at various times, never you nor the attorneys never went back to institutions and said hey, do you still have those filters so we can do some further evaluation?
A. Never have.
Q. Now you say the values fluctuate depending on whether or

not basic housekeeping controls were utilized during the procedure, right, that's what you wrote?
A. That's correct. You can certainly see that in the secondary manufacturing operations.
Q. But that doesn't say in the secondary manufacturing operations. In fact, it's in reference to all phases of the hand operations, correct?
A. It follows that sentence.
Q. So what you're saying is, basically putting the scraps in a plastic bag caused the values of the airborne dust to be fluctuating, correct?
A. No. No. That's not the intent of that sentence at all.
Q. Wire brushing by its mechanical action would produce higher dust concentrations than hand scraping. That's what you wrote?
A. That's a logical statement.
Q. I thought I just asked you that and you said the data doesn't support that?
A. The subsequent data does not support that.
Q. Basic housekeeping controls maintain airborne concentrations at comparable levels. What's that's telling me is putting the debris in a plastic bag, affects the difference between wire brushing and hand scraping. That's what you were intending with that sentence, correct?
A. I don't recall a specific intent. I don't think it made

any difference as your -- as the committee's expert Roger Beckett doesn't think it made any difference either.

Q. You thought it made difference enough back when you did the test before you started testifying for Garlock that wire brushing would produce higher dust concentrations than hand sanding, right?

A. You read the sentence correctly. I don't recall exactly what my logic was in writing that sentence.

Q. But when you wrote that, you wrote it noting -- you thought it was important enough to put in the summary of your report?

A. Yeah. I think when you get to the recommendations, you'll see what we felt was really important.

Q. Well, let's talk about -- you talked about Dr. Selikoff and his statement about asbestos being safe. Do you recall that on Direct?

A. Yes.

Q. Now you're aware that P.G. Harries was an investigator in the Her Majesty's Dockyards in Davenport that did testing of asbestos being generated various activities during the repair of ships, right?

A. Yes.

Q. And in fact, they commented on various products on the ship by creating a table. That table indicates most of the asbestos materials used in the dockyards -- and they divided

into two categories. Those giving rise to dust in their manipulation and those not usually giving rise to dust unless they are ground, polished or sawn, correct?

A. That's what it says. And he goes on to say I don't recall if it's in this particular article or a different one where he says that the gaskets and packing are not a hazard in shipyard applications.

Q. Well, we'll get there. But right here what he's saying is, we're going to put two charts. The first chart is gonna be those things that get manipulated, either mechanically or by hand and they generate dust. The second one where they are left alone, correct?

A. Okay.

Q. And so what he put in the first chart, the dusty stuff with the blankets, the cloth, the cement, cord fiber. These were all things that would have been manipulated in some fashion. And the non-dusty enclosed is the jointing strips, correct, and gaskets?

A. And he separates them out as dusty and non-dusty.

Q. And he puts them in the non-dusty category, because as long as those materials are not ground, polished or sawn, then they're not going to generate any dust. And you agree with that. If I'm holding a gasket, it's not going to generate dust from me holding it, is it?

A. No.

Q. It's not going to generate dust if I hold it and then put in a flange and bolt it together, is it?
A. No.
Q. When it's going to create dust is when it's been in that pipe for 10 years or two years or three years, and because of the heat of its incorporation, the gasket kind of deteriorates to a point that when you take it off it's like that. And scraping that is going to generate dust, correct?
A. Our study indicated that didn't. If you go back a slide from that one, you'll see that all those slides were non-detectable involving that operation.
Q. Except we don't know whether, one, those gaskets contained asbestos at all. Two, we don't know what the condition of those gaskets are.
If you open that gasket -- if you open that flange and the gasket dropped out, you wouldn't expect there to be any dust, correct?
A. I would not. I also wouldn't expect that the Navy used non-asbestos gaskets when their specification required asbestos-containing gaskets.
Q. Well, you don't have nothing in your report that tells us where the test was done. We don't even know what type of pipe it was done on to know whether it's an asbestos -- a pipe that would be subject to a military spec or not, correct? That information is just not there?

A. That is not in the report. We obtained that information from the production department of the shipyard.
Q. Again, that's something we have to take your word for it because there's no appendix that has that information. There's nowhere that gives us the location or type of pipes that these removal procedures were performed on, correct?
A. Have to take the word of the author of the report.
Q. Now here's what you're referring to. So now this is done in 1971. The first one in '68, so three years later. Same author. Is there any data in this paper where the author collected information on how much dust is generated during the use of gaskets?
A. No.
Q. You don't know of any study that P.G. Harries relied on between 1968 and 1971 that had actual data on how much dust was generated by the use of gaskets, correct?
A. Correct.
Q. And yet he sits here when he's talking about high temperature jointing and pack materials, first of all there was no substitute, right?
A. Right.
Q. And it says, no health hazard in forms used in shipyard applications?
A. That's correct.
Q. Now he's referring to the form being, I took the gasket

out of a packet. I opened the flange and I put the gasket in. You would agree that that is a non-dusty no health hazard procedure, correct?

A. I'm sorry. How did you determine that he was just talking about the installation?

Q. Well, where in there does he say he's talking about the removal of gaskets, the manipulation of gaskets. It doesn't say "procedure", it says "forms", does it not?

A. Yeah. I think that's quite a stretch to say that he was that blind to the whole life cycle of a gasket.

Q. Now that information that's contained right there is exactly what Dr. Selikoff put in his book, correct?

A. It is.

Q. You don't know anywhere between 1971 and 1978 where Dr. Selikoff or any of the Mount Sinai people went aboard a ship or anywhere else, took gaskets and measured the dust that was generated by their creation or removal, correct?

A. That's correct.

Q. You don't have any data other than what the non-data that P.G. Harries had that supports the statement that Dr. Selikoff made, correct?

A. Correct.

Q. Now you know -- at least Garlock knows -- did they share with you their Material Safety Data Sheet?

A. I didn't look at it recently. I think I've seen this

one.
Q. You know that it was 80 to 90 percent asbestos at least in this style. And they said, the asbestos fiber is bound and encapsulated by a vulcanized elastomer matrix. The fibers do not present a hazard as long as the matrix remains intact. That's what Garlock said, correct?
A. Right.
Q. In fact, they didn't say it once, they said it more than once in the same documents. They say, "these products do not pose a health hazard under ordinary conditions of use. A health hazard would arise only if the products were subjected to mechanical actions that would cause the asbestos fibers to be released from the elastomer compound matrix. Inhalation of such airborne fibers can cause the well-known long term effects of asbestosis, lung cancer, and mesothelioma."
Basically what they're saying, as long as you leave it intact, you're not going to create any dust, correct?
A. Talking about the not hazard under ordinary conditions of use. I'm not saying that you couldn't have some unusual condition of use that would release a lot of fibers.
Q. Is it an unusual condition of use to somebody to take a mechanized wire brush, which would be a mechanized action, and remove a used gasket from a flange?
A. No. I think that's an ordinary condition of use. And I don't think you have significant fibers from that operation.

Q. Well, apparently Garlock disagrees with you, because they say that a hazard would arise in that type of situation.
A. No. There's -- I think what they're saying is, they don't cause a hazard under ordinary conditions of use.
Q. It says grinding or machining of the product should be avoided, since these or similar operations may generate asbestos dust. And if you do, any of that dust should be vacuumed up, sealed in a plastic bag and disposed of in accordance with the instructions from a disposal company?

MR. HARRIS: Excuse me, Your Honor. Could I have a copy of the document that he's referring to there?

MR. GEORGE: Sure.

MR. HARRIS: Where is that quote from?

MR. GEORGE: Look at the sheet itself.

Do you want me to put up the slide so we can satisfy Mr. Harris that I'm not making this stuff up.

I think where it's coming from is exactly where it says, "grinding or machining of the product should be avoided since these or similar operations may generate asbestos dust. Any such dust should be vacuumed up, sealed in a plastic bag and disposed of in accordance with the instructions from a disposal company."

Your Honor, I'll offer this as ACC-3 since it was referenced in the manual.

(ACC Exhibit No. 3 was received into evidence.)

MR. SCHACHTER: May we have just a minute?

THE COURT: Yes.

MR. SCHACHTER: Your Honor, we have -- although Mr. Harris is the presenting witness, I raised this objection yesterday, that this is 1980's document, 1986, after all the asbestos litigation went into effect, and after the requirement of producing MSDS.

Mr. Finch, I believe incorrectly stated, that claims arising from use during the 1980s, were at issue in this case. I've checked and even under their expert's econometric measures, no one -- they're not valuing any of these cases. Garlock's products had voluntary warnings in the 1970s. These cases from the '80s are not cases that were customarily given any value under anybody's sense in this case. When Mr. Finch said that those claims are at issue in the 1980s, appeared to be advancing the scope of what we're doing here and changes things.

So we object to this MSDS for all those reasons and --

THE COURT: I'll overrule the objection.

MR. SCHACHTER: -- and may we have a continuing objection to any mention of the MSDS so we don't have to interrupt again.

THE COURT: I understand.

MR. SCHACHTER: Thank you, Your Honor.

BY MR. GEORGE:
Q. And then finally, Mr. Liukonen, it says, "when removing used gaskets, avoid excessive mechanical actions and place the asbestos-containing residues in a plastic bag for disposal. As a precaution, a dust mask should be worn by individuals when engaged in the removal of these gaskets."
That's what Garlock was telling its customers.
A. That's an appropriate conservative recommendation in the 1980s.
Q. Sure. That was an appropriate conservative recommendation in the 1970s, correct?
A. I think it's even more conservative in the 1970s.
Q. Nevertheless, it's an appropriate recommendation for somebody who's taking mechanical operations on a product that contains 80 to 90 percent of asbestos, to wear a mask when you're using mechanical operations that will liberate that asbestos into the atmosphere, correct?
A. The scientific data does not support that requirement.
Q. Are you familiar with the Navy Safety Occupational Health Program manual for the Forces Afloat that was generated in May of 2007?
A. I am not.
Q. In this document they say, "a primary concern is asbestos has the potential to become airborne through friability." And friability is the ability to be crushed with hand pressure.

They say, "gasket material that has been exposed to high heat over time and damaged asbestos packing materials may also be friable."

So their definition of friable is the fact that it's been in there for that long period of time, would cause the gasket to be a material that could liberate dust, correct?

A. I'm not sure the question you asked. They quoted the proper definition of friable is can be crumbled with hand pressure. That's the appropriate definition. I'm not sure what your question is. I think I lost you in there.

Q. Well, if a sheet gasket material has been used in high temperature applications for a significant period of time, then it's no longer a sheet with an elastomer on it, it is essentially a collection of asbestos fibers that can be crushed with his hands, correct?

A. No. The definition of friable still is, can it be easily crushed by hand pressure. You can see from these pictures that's not necessarily the case. Gaskets can sometimes, as your own experts will testify, sometimes can be difficult to remove. All the elastomer is not gone.

Q. Well, according to the Navy, "friable asbestos material is defined as a material that can be crumbled, pulverized, or reduced to powder under hand pressure, thereby releasing airborne fibers. Friable asbestos-containing material represents the most significant heath hazard because airborne

fibers can be released, and typical examples of friable material is, among others, asbestos sheet material used in high temperature applications. That's what the Navy said, correct?

A. What they're saying in what, 2007 or wherever you are, yes.

Q. Are you aware of the OSHA fact sheet on ship breaking?

A. No, I'm not.

Q. Do you understand what ship breaking is?

A. Yes.

Q. That's when you take the ship that's coming out of commission and you've got to take all the asbestos off that ship, right?

A. I believe so. I've never been involved in that process but I believe so.

Q. And among the hazard exposure in ship breaking is asbestos in the hanger lines, mastic under insulation, cloth over insulation, cable, lagging and insulation, adhesive, gaskets on piping connections and valve packing, according to OSHA, correct?

A. Those are locations where you would expect to find asbestos.

Q. In fact they point out, here are the potential locations, and among them are asbestos gaskets, correct?

A. Yes.

Q. Now, there were -- I just want to end on this. When you were listing the different gasket studies that were -- one of the things that you did not mention was the study that was done by a Dr. Millette on the releasability of asbestos fibers that was done in 2005, I believe?
A. I only listed peer-reviewed studies. Did Dr. Millette have a peer-reviewed study?
Q. Yes.
A. I did not list that study.
Q. In fact, if my computer behave --
MR. HARRIS: We object to the extent that Mr. George is testifying about whether it's peer reviewed. In fact, it's not a peer-reviewed paper that he's referring to.
MR. GEORGE: To the extent Mr. Harris is objecting it's not peer reviewed, it appeared in a publication.
THE WITNESS: What publication?
BY MR. GEORGE:
Q. Well, I'll tell you as soon as it comes up.
It was in the -- it's right there. It's the *Industrial Hygiene Technical Journal*.
A. No it's not in the *Industrial Hygiene Technical Journal*. It's some other technical journal, it is not a peer-reviewed article so I didn't consider it.
Q. So the fact that he found hand scraping generating -- with power wire brushing generated 2.1 fibers per cc, the

power wire brushing generated 6.8 fibers per cc, and that broom sweeping of the area generated 5.5 fibers per cc was not something that you considered in your chart?

A. No. I discounted his work. You can see some of the reasons for it on this slide.

TEM can only be used to reduce exposures, according to NIOSH 7402. He has TEM increasing exposures, that's not possible.

He also he did a number of activities, that broom sweeping is not an activity. The way he did it is normally done in industry. He was trying to produce a lot of dust and then see what would happen when he did it.

I've also -- he's also one of these people who is not a industrial hygienist and misuses a lot of industrial hygiene techniques.

Q. So he used TEM. How did he increase exposure. There are two different measurements. One is fibers per cc, and one is structures per cc?

A. Right. The proper way to use electron microscopy for asbestos is, you look at the -- after you've done phase contrast, you look -- use the electron microscopy to determine the percentage of fibers there are asbestos. So you can only stay at 100 percent, you can't go to 10,000 percent. You can't find more fibers that are asbestos than the fibers that are there.

Q. He's not doing that.
A. Yes, he is.
Q. He's recording one as fibers per cc, and the others as structures per cc. Two different things, correct?
A. Absolutely it's two different things. It's a total misuse of electron microscopy. It's not the way it's done regarding asbestos. That's not what the NIOSH methods call for.
Q. Let me break this down a little bit here.
You agree that transmission electron microscopy, which can go down to 25,000X, sees more in a sample than a phase contrast microscope that's at 400X, correct?
A. Absolutely. But if you measure my speed in inches per month instead of miles per hour, it's a different number. That doesn't mean it's better. There's a standard methodology that you have to use for measuring asbestos, and he misused that methodology and came up with a higher number which is impossible if you follow the method correctly.
Q. I don't understand where your higher number is coming from. From hand scraping, with the fibers that he found using a phase contrast microscope looking at fibers that are detectable at 400X, he found 1.4 fibers per cc. When he used a more powerful microscope and was able to see fibers of thinner diameter he found 3.9 structures per cc, structures that TEM would identify as asbestos, correct?

A. Okay. A couple answers. You said he found 1.4, he didn't, he reported .14.
Q. I meant 0 point --
A. Right. And also, yes you can do that, but that's inappropriate use of the method. He used the method incorrectly to get a higher number. If you use the method correctly, you cannot get higher than the number you originally started with.
It's designed to give you a percentage of the fibers that are there. What percentage of the fibers are asbestos. He's saying obviously it's more than 100 percent were asbestos which is physically impossible.
Q. What a transmission electron microscope does, is it takes the filter medium that was looked under with the phase contrast microscope, they put the material on grids and they count how many structures they can see in a grid, correct?
A. That's my understanding.
Q. Then they count up how much grids are in the viewpoint of the microscope. And by knowing how big the original material was to start with, they can calculate how many structures there are for a given sample size, correct?
A. Correct.
Q. That's what he did here?
A. Right. But it's irrelevant because he's using an inappropriate sampling method.

You know, if you say I'm overweight though I weigh 180, but then you measure me in ounces and it's a larger number, that's just an inappropriate use of the method.

Q. Now there was another study that you didn't mention, unpublished study, was a study done by Shell, correct? You're familiar with Shell gasket study?

A. I don't call these studies. These are data points that you can find. There are literally hundreds of data points. What you have done is picked out -- I'm sure you're not finished yet. You picked out one so far that finds a high number. I did not refer to the hundreds that support my opinion. I referred to the quality peer-reviewed studies, and that's what I limited it to.

Q. Well, now I thought when you were on direct examination you talked about unpublished studies as well as published studies, correct?

A. Which ones?

Q. You had a whole chart.

A. Those were all published peer-reviewed studies with the exception of the Navy Gasket Study.

Q. Now this is a study done in the field, correct? This is not something that plaintiff's attorney paid for?

A. It's a single sample done in the field.

Q. Well, there's actually two samples. Because what they did is they found 28.4 fibers per cc by the person doing the

gasket removal. And then when they measured what was happening 4 feet away to a co-worker, they found 16.10 fibers per cc, correct?

A. That's what was -- that's what was on this data sheet, this handwritten data sheet. Do you have a report that was written as a result of this data sheet.

Q. I just -- that's all -- I can give you this. This is from Shell Oil Company. This went to all their maintenance personnel. "We recently made tests to determine asbestos exposure from grinding or burning Durabla gaskets from flanges. The test results we received show that these procedures exceed safe limits. Therefore, do not use this procedure from removing Durabla's gaskets until further notice."

A. I don't know why you would burn a gasket from a flange. That's a very unusual activity.

Q. That's not the only activity they measured, correct?

A. It says grinding and burning. It also said back on the first page, was to simulate the worst case exposure.

Q. Last point. You're aware that Mr. Boelter actually wrote to the editor in chief of the Applied Occupational Environmental Hygiene Digest to try and prevent the publication of Dr. Longo's paper. You're aware of that, correct?

A. I'm not aware he did that. I think it was a good idea.

I'm not aware he did that.
Q. Did you participate in that at all?
A. No.
MR. GEORGE: I don't think I have anything further. Thank you.
THE COURT: Mr. Guy?
MR. GUY: Thank you, Your Honor.

CROSS EXAMINATION

BY MR. GUY:
Q. Mr. Liukonen, my name is Jonathan Guy. I represent the Future Claimants Representative in this case, Joseph Grier, III. And if you've been in the courtroom you probably know what I'm going to ask.
Your article that you wrote concerning the removal of gaskets from the diesel engine was from 2004, correct?
A. Yes.
Q. And you talk about the studies that Mr. Boelter and Dr. Mangold did for Garlock in 2002 and 2006, correct?
A. Yes.
Q. And when was the Bremerton study which was prepared in 1978? When was that first available to the public?
A. Oh I don't know that it was ever available to the public distribution. It was a government document. It turned out to be very widely distributed.
Q. When was it first distributed so it would be available to

an asbestos defendant such as Garlock?
A. I don't know.
Q. Before 2005, correct?
A. I would think so but I don't know.
Q. And you've testified for Garlock 10 times?
A. I think he asked me -- it was at least 10 times. I would expect that it is at least 10 times.
Q. And over a 15 year period, correct?
A. Something like that.
Q. And the information that was talked about on cross examination, the Harries' report and the other reports talking about exposure to asbestos fibers in connection with the removal and installation of gaskets. That was available to Garlock before 2005, correct?
A. I would assume so.
Q. And to the extent the arguments on either side of this issue as to the exposure to asbestos fibers from removal and installation of gaskets, the strengths and weaknesses on either side, those arguments pretty much stay the same, correct?
A. Well, I don't know. I rarely -- I have the same opinions I did in 1978. I testify about those opinions. I rarely hear other arguments. I hear cross examination questions which tend to be the same. But I don't hear other experts, so I don't know if I can answer that question.

Q. And the strengths and weaknesses of those arguments on either side were available to both the plaintiffs who were bringing cases against Garlock, and to Garlock during the 2005 and 2010 timeframe, correct?
A. I think you're asking me questions about things that I have no knowledge.
MR. GUY: Thank you, Your Honor.
THE COURT: Thank you.

REDIRECT EXAMINATION

BY MR. HARRIS:
Q. Mr. Liukonen, I wanted to just follow-up on a few brief things that Mr. George covered with you. He was projecting this table from a paper by Dr. Millette. Do you know Dr. Millette or understand who he is?
A. Yes, I do.
Q. He was a committee-designated expert that they've, I believe, withdrawn in this case. In that paper do you recall any discussion by him that he did those studies, they were paid for about plaintiff's lawyers?
A. I believe they were.
Q. I understand they were paid for by it, but do you recall any disclosure that he made --
A. I don't believe that was disclosed in his paper, no.
Q. I want to go back to this table. You were having a discussion with Mr. George about the different microscopy

methods.

What we see here is the PCM in the first column which you've explained is phase contrast microscopy.

A. Yes.

Q. And TEM is transmission electron microscopy, correct?

A. Yes.

Q. And I believe what you had explained was that there is a method for analyzing air samples for occupational exposures by transmission electron microscopy; is that correct?

A. Yes.

Q. What was the name of that method?

A. It's NIOSH 7402.

Q. Can you tell us what that -- what that method does, how the results are calculated?

A. Sure. I use -- I've used that method frequently over the years whenever I find a detectable level of asbestos or fibers by phase contrast microscopy. I have the lab go the next step use NIOSH 7402. They tell me the percentage of asbestos -- of fibers on that filter, and they identify the fiber type.

So, for example, I think in the one that Dr. Weir and I did, I think on the one sample we found something like 75 percent of the fibers were chrysotile. So if you use TEM correctly, you would reduce the concentration by a factor of .75.

Q. You multiply .75 times the phase contrast microscopy

result?
A. That's correct.
Q. And it looks like that Dr. Millette was not doing that, he was doing some other TEM procedure; is that correct?
A. That's correct.
Q. And I believe it says there at the bottom, there's a double asterisk says, "transmission electron microscopy identifies and counts asbestos structures containing fibers greater than 0.5 microns in length and greater than 0.02 microns in diameter.

Now that's 0.5 microns in length is what he counted to report these larger numbers. Can you tell us what -- what is the length -- the minimum length of the fiber that's counted under the OSHA rules and that you would count in industrial hygiene?
A. The rules require us only count fibers greater than five microns in length. He's counting 1/10th of that.
Q. One-tenth. That's what he counts in order to put those big numbers in his chart; is that correct?
A. That's correct.
Q. Mr. George also asked you about this data sheet. This is a handwritten data sheet from Shell; is that right?
A. Yes.
Q. And it appears to be -- now is this the kind of thing that you would rely upon as a professional industrial

hygienist, the handwritten data sheet of somebody else?
A. Typically not. Certainly not when we have quality peer-reviewed studies that are available.
Q. Now you cited to the court this insulation -- remember that paper, or the -- this report, you cited this report earlier to the court. I mean it's not necessarily a formal report, it's a memorandum though?
A. That's correct, of data that I collected and analyzed.
Q. Now how is this -- relying on this different than relying on a handwritten data sheet that someone produced?
A. Well, that's actually a written report that publishes the results that we found. It's not the actual data sheet. But I don't know if anybody felt strongly enough about it to write a report on it.
Q. And you're talking about the Shell sample?
A. Correct.
Q. And of course this is one that you actually prepared; is that correct?
A. That's correct.
MR. HARRIS: Your Honor, at this point we offer this document GST-15394 into evidence.
MR. GEORGE: No objection.
THE COURT: We'll admit that.
(Debtor's Exhibit No. GST-15394 was received into evidence.)

BY MR. HARRIS:

Q. And this is something I wanted to -- I found interesting about this. This is the handwritten description here in the data sheet. I would like to blow that up so we understand what we're talking about.

It says, "pump on, Durabla gasket removed from 6-inch valve. Valve was previously in water service. Took place in makeshift shop underneath old number 14 boiler, visqueen all around blocking wind." So this is a sample that's being collected underneath a boiler?

A. Yes.

Q. And there are no background samples. We don't know what the background is, correct?

A. That's correct.

Q. By the way, this is by phase contrast microscopy; is that right?

A. Yes, it is.

Q. So do we know whether these are asbestos fibers that are reported or not?

A. No, we don't.

Q. Okay. Do we know whether this is even a compressed sheet gasket as opposed to a beater-add gasket or a spiral wound gasket or some other type of asbestos gasket?

A. No, we don't.

Q. It says, "simulates worst case situation." So it appears

that someone went underneath a boiler, removed a gasket, trying to simulate the worst case situation they could find --

A. Yes.

Q. Is that right?

A. Yes.

Q. That's what Mr. George found important.

It says, "simulates worst case situation. Gasket ground off with a hand grinder, considerable dust, debris, gasket material thrown off of grinder." Did I read that correctly?

A. You did.

Q. All right. Does it sound like anyone even tried to use a hand scraper to try to remove the gasket first?

A. It doesn't sound like it. They don't mention it.

Q. Is that your normal practice for someone to do that?

A. It is not.

Q. Is this a usual or an unusual activity?

A. It's an unusual activity.

Q. It looks like there was a gasket on a flange and someone just put a grinder on it, right?

A. Correct.

Q. Trying to simulate the worst case situation?

A. Yes.

Q. It may be appropriate for Shell to do something like that, but that's not the kind of information that informs your opinion?

A. No, it's not.
Q. Is this similar to what was put in the MSDS that Mr. George showed you about avoid excessive mechanical operation?
Typically in usual operations there's no concern, but avoid mechanical actions, I guess like this, that would release -- cause the asbestos to be released from the elastomer compound?
A. That's the way I read the MSDS, was to avoid these unusual operations.
Q. Like to turn back to your gasket study, Mr. George questioned whether these were asbestos gaskets that you were removing.
I wanted to know, could you explain to us again -- or clarify for us how was it that you knew in your study for the United States Navy that you were actually working with asbestos gaskets?
A. We told the production superintendent what our project was, and what our intent was, and had him inform his subordinates to let us know when they were working with asbestos-containing sheet gaskets.
These are lists of some of the gaskets that the Navy used, and these would be some of the things, you know, certainly for installation were used. But this is the sort of thing we would expect also to find in removal operations.

Q. This was attached to the back of report; is that correct?
A. It is.
Q. And actually has -- it specifies here, "compressed asbestos per mil A17472, 1/16th inch thick; is that correct?
A. Yes. The mil -- mil spec.
Q. There's a military spec tat says what these gaskets are supposed to be made of?
A. That's correct.
Q. Okay. He also asked you about housekeeping and the different operations. Here's machine nibbling. I found this interesting. He showed you where housekeeping may have impacted the results where they were lower. Here it looks like for machine nibbling -- can you tell us did the housekeeping increase or decrease the exposures?
A. In this case it looks like it decreased -- or increased the exposure, you know. It's -- we indicate there that it may be due to short sample length on some of these so it's hard to tell.
Q. And these are all in the same range; is that right?
A. Yes.
Q. Is that consistent or inconsistent with just putting the scrap in a plastic bag?
A. Yeah, that would be consistent.
Q. This is machine nibbling. This is a picture of the guy wearing the respirators; is that correct?

A. Correct.
Q. I want to see if we can show this. I need to turn the volume up, and I hope this works.
(Video playing.)
(Video stopped.)
Q. Who is this?
A. Roger Beckett, he was the third author on the paper. He was my supervisor in Bremerton.
Q. And you've read his deposition?
A. I have.
Q. And what you said about the use of housekeeping, when it was used and what it meant, is his testimony the same as yours?
A. Yes, it is.
MR. HARRIS: Your Honor, at this time we'll offer the Bremerton study, the Navy study that was done in 1978 for the United States Navy, GST-11974.
MR. GEORGE: No objection, Your Honor.
THE COURT: It's admitted.
(Debtor's Exhibit No. GST-11974 was received into evidence.)
BY MR. HARRIS:
Q. Also yesterday, Mr. Liukonen, we talked about overhauls that were going on at the time of your study?
A. Yes.

Q. And we showed a portion of record produced by the United States Navy that was attached to and produced at your deposition. We've marked this as GST-15408 and we offer this into evidence.

MR. GEORGE: Object on relevance grounds. He said that none of his testing was done on the ship, so I don't see the relevance.

THE COURT: We'll admit it.

MR. HARRIS: Excuse me, Your Honor?

THE COURT: We will admit it.

(Debtor's Exhibit No. GST-15408 was received into evidence.)

BY MR. HARRIS:

Q. Your testing was done on ships that were in the shipyard at Bremerton, or at the Puget Sound Naval Shipyard in 1978; is that correct?

A. That's correct.

Q. And that document reflects all the ships that were in service at that point in time during your study; is that correct?

A. That's correct.

Q. Mr. George asked you about this article from P.G. Harries. This followed the article that he was discussing with you of dusty and non-dusty products in the shipyard?

A. Yes.

Q. And that article that he was referring to, they were using the terms dusty and non-dusty. Were they describing these products like we described them as friable and non-friable?
A. That seems to be what they were doing.
Q. Okay. And this is the quote that he presented to you. P.G. Harries, official doing research in the dockyards of Great Britain said in 1968, "no substitute heat resistent material available for asbestos fiber and compressed asbestos fiber no health hazard in forms used in shipyard applications."
The purpose of what he was talking about, was about proposing substitute materials here; is that correct?
A. Yes.
Q. But he also does include some data in this paper; is that right?
A. Yes, he does.
Q. He talks about insulation exposures; is that right?
A. Yes. It was quite high.
Q. Well, for boiler rooms they found a range of between 0.04 and 1,062 fibers per cc; is that correct?
A. Yes.
Q. And for engine rooms they found between 0.16 and 3,021 fibers per cc, correct?
A. Yes.
Q. This was published in 1971, so this would have been

exposures before 1971, right?
A. Correct.
Q. What you reported to the court and described in finding 100 fibers per cc or more from insulation removal, was after controls had been started to be implemented -- minimum controls, but some controls been implemented; is that correct?
A. That's right.
Q. Now I want to ask you about this -- Mr. George has suggested that your opinions have been influenced by the work that did you for Garlock. And I want to go back to something that we showed the court yesterday.
The first entry under asbestos experience is developed US Navy's first video training program on asbestos removal for non-insulation workers; is that correct?
A. That's right.
Q. You did that?
A. I did. It's a little primitive by today's standards, but I did.
Q. So what was the purpose of that?
A. The purpose was to tell people to leave the insulation work to the insulation workers.
Q. Did you comment on asbestos gaskets?
A. Yes, we did.
Q. What did you say in the video?
A. We said that the asbestos fibers in certain products such

as gaskets were locked in, and didn't normally present a hazard.

Q. Is this an excerpt of this video?

A. Yes, it is.

(Video playing.)

Q. Is this you?

A. Afraid so.

THE COURT: Nice hair.

(Video stopped.)

Q. We don't need to go on and play through the whole training program. But I wanted to ask you, Mr. Liukonen, this is what you were saying back in what year, or what time period?

A. That was -- we put that together in 1977.

Q. Okay. There's also, I think in the video, a picture of someone that is dressed up in insulation or in abatement suit; is that correct?

A. That was Roger Beckett who was in the suit, yes.

Q. Mr. Beckett participated in preparing this video as well; is that correct?

A. Yes.

MR. GEORGE: Your Honor, I don't know how is this in redirect. This is all supposedly because I got him to testify that he testified for Garlock in the past. This is not anything that I did in cross. Seems to me he's exploring an

entire new area that he should have been done in Direct.

THE COURT: We'll let him wind it up.

BY MR. HARRIS:

Q. So I want to wind up. You used the phrase in that video we just saw of the asbestos being "locked in", and it reminded me of Dr. Selikoff.

Are you familiar with his publication or a publication in which he wrote an article in "Partnership for Prevention".

A. Yes.

MR. GEORGE: Do you have the article?

MR. HARRIS: I don't have it.

MR. GEORGE: Your Honor, I don't know where that comes from. There's no reference to it.

MR. HARRIS: You know the article.

MR. GEORGE: I don't know the article, I wouldn't be asking the court if I did.

MR. HARRIS: We'll get you a copy of it in just a second.

THE COURT: Go ahead.

BY MR. HARRIS:

Q. Dr. Selikoff commented on these products said, it's fortunate that the greatest part of the asbestos and construction materials has been in products in which the asbestos is locked in. That is, it is bound with cement or plastics or other binder, so that there is no release --

certainly no significant release of asbestos fibers in either working areas or general air."

Do you agree with Dr. Selikoff?

A. I do.

MR. HARRIS: Thank you, Mr. Liukonen.

THE COURT: Do you have anything else you want to ask, Mr. George, since some of this was new?

MR. GEORGE: Just one thing I wanted to clear up.

RECROSS EXAMINATION

BY MR. GEORGE:

Q. I asked you at the end of my examination whether you had participated in any attempt to prevent Dr. Longo's article from being published?

A. No. You asked me if I participated in a letter Mr. Boelter wrote, and I did not.

Q. Now, this is a letter that Mr. Mangold wrote. Mr. Mangold wrote to the editor and said that you should not publish this study. Did you participate in that?

A. I did not participate in that letter either. But in the interest of full disclosure, I contacted the editor verbally, and told him of the junk science ruling against Mr. Longo -- Dr. Longo in Texas, and advised him that he should at least be aware of that if he was considering publishing the paper.

Q. So you took a ruling in court, and you went to the editor of a magazine which has a peer-review process, and you told

the editor, hey, when you peer review this article, you should know that some court somewhere based on something said that what Dr. Longo is doing is junk science?

A. I thought he should be aware of that, yes.

Q. Is that what a disinterested scientist does is attack the work of other scientists by what happens in a litigation proceeding?

A. I'm not a disinterested scientist. I'm interested in quality science being produced. I was also familiar with the work, I knew it was junk science.

Q. Well you're not disinterested because you're an advocate for what Garlock is trying to portray, correct?

A. I'm interested party because it's -- because it was junk science.

MR. GEORGE: Nothing further.

THE COURT: Okay. Thank you. You may step down.

THE WITNESS: Thank you, sir.

THE COURT: Why don't we take a break until 11:30.

(A brief recess was taken in the proceedings at 11:17 a.m.)

MR. FINCH: Your Honor, one housekeeping matter before the next witness.

Yesterday the Court admitted over Garlock's objection a different Material Safety Data Sheet we had marked that ACC-4. I would just like to hand it up to the court.

THE COURT: Okay.

MR. FINCH: And one additional point for the record, so that the record is clear on the -- their objection, our response to the objection.

One of the bases in our response in addition to -- for purposes of an impeachment, and it's an admission of Garlock, is that there are going to be claims channeled to a trust, or based on exposure after 1979. Unless Garlock or EnPro will stipulate that they're not seeking to have claims for first exposure after 1979 transferred to the trust, I think it is clearly relevant.

MR. SCHACHTER: Your Honor, I don't think you have to deal with this right now. The point is that no one has, in the evidence that's been prepared for this, has valued any of those claims, because they were never given any value if the exposure was after '78. But we can deal with that after.

THE COURT: Okay. All right.

Next witness.

MR. HARRIS: The debtors call Fred Boelter.

FREDERICK WILLIAM BOELTER,

Being first duly sworn, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. HARRIS:

Q. Good morning.

A. Good morning.

Q. Please tell us your name.
A. Frederick William Boelter.
Q. Where are you from?
A. Chicago, Illinois where my office is located.
Q. What do you do for work?
A. I'm an environmental engineer by training. I do occupational and environmental hygiene. I'm a certified in industrial hygiene. I do broad based work related to exposures to toxic and physical agents.
Q. How long have you been doing this type of work?
A. 40 years.
Q. This proceeding involves asbestos gaskets and packing. Are you familiar with them?
A. I am, yes.
Q. Have you tested or evaluated those?
A. Yes, I have.
Q. Have you -- will you be able to tell us about those tests that you've done?
A. Yes.
Q. We've shown some videos of work with insulation earlier this week. Have you conducted a study of the historic exposures of pipefitters from insulation during the maintenance of piping systems?
A. I have.
Q. Have you prepared some slides to help us understand that?

A. Yes.
Q. Before I ask you about these matters, I would like to ask you a little about your educational background and your work experience. Mr. Boelter, where did you go to school?
A. Purdue University in Lafayette, Indiana.
Q. And what degree did you receive?
A. Bachelor of Science and environmental engineering in 1973.
Q. You're a certified industrial hygienist?
A. Yes.
Q. We have an understanding of that.
You're a licensed AHERA inspector; is that correct?
A. Yes.
Q. What is a AHERA, and what does a licensed AHERA investigator or inspector?
A. AHERA is an acronym that stands for the Asbestos Hazard Emergency Response Act. It was an act of Congress in 1966 -- 1986/1987 that is often referred to as Asbestos in Schools Rules. So these are the licenses that relate to conducting inspections in buildings, and is focused on school rooms K through 12. But it also applies to commercial and other buildings in various -- on a state by state basis.
Q. You're a registered professional engineer?
A. Yes, I am.
Q. Is that by field? Are there different fields in which

you become a registered professional engineer?
A. There are some designations, for example, a structural engineer is a specific designation. Otherwise it's generally, you test in a particular discipline and you become a registered professional engineer and your obligation is to stay within your area of expertise.
Q. What is that area of expertise with respect to your professional engineering registration?
A. I have, for example, I have stamped drawings that relate to environmental engineering, civil engineering, mechanical engineering. There's a broad range of areas where I have expertise in engineering.
Q. I would like to ask you a little bit about your work experience. Where did you go to work after you graduated from school?
A. My first job out of school was working for a company called Envirex. It's a subsidiary of Rexnord in Milwaukee, Wisconsin.
Q. All right. How long did you work there?
A. Three years.
Q. All right. And then we have here -- it's identified here, OSHA compliance officer from 1976 to 1980; is that right?
A. That's correct. I was a field compliance officer in the Milwaukee area office for one year in 1976. Then I was asked

to transfer to the regional office in Chicago where I was in a group called Technical Support, supporting six state region 13 office region, as well as working on loan to the national office on emphasize programs.

Q. So what does OSHA have to do with workplace safety and asbestos in particular?

A. Well OSHA is the agency that enforces regulations in this country with regard to health and safety. It is mandated by an act of Congress, and does inspections for workplace compliance.

Q. All right. You did inspections?

A. Yes. I did about 100 inspections.

Q. Did any of those have to do with asbestos?

A. Yes, a number of them did.

Q. What were you inspecting with respect to asbestos?

A. At the time when I went to the agency in, I think it was in early 1976, there was already on the books a change anticipated in July of 1976 with regard to the allowable limits, permissible exposure limits that OSHA was enforcing. So there was an emphasis on asbestos. And I was inspecting facilities that were manufacturing various products from asbestos-containing ingredients.

Q. Do you remember what the products were that were being manufactured that you investigated?

A. Yes. Some of them -- there were a range. Some that were

manufacturing were making, for example, cores for electrical transformers. They were rolling asbestos paper and dipping it into resins. I did inspections at facilities that were using brake materials to line brakes for industrial application, such as heavy overhead cranes, and heavy construction equipment, as well as automobiles. And also using materials like cement boards for different applications.

But there were a variety of -- I also did inspections in a foundry there was, one comes to mind where an asbestos rope was being used as a wick to light off furnaces.

Q. Did you collect air samples yourself?

A. I did, yes.

Q. Did you ever do any analysis of air samples?

A. I did analysis of some air samples when I was with OSHA, if that's what you're asking about?

Q. Yes.

A. Yes.

Q. Okay. You left OSHA in 1980 and went into private consulting for, I guess, ever since 1980; is that right?

A. That's correct.

Q. You worked for some other firms, at some point you started your own firm?

A. Yes. In 1985 I started my firm Boelter Associates, Inc. And I sold that firm in 2007 to the company that I currently work for Environ.

Q. During this time have you -- what are the nature of the industrial hygiene projects that you have worked on over the past 30 years or so?

A. Well, there have been quite a few, as you can well imagine. They have ranged from -- I conducted or overseen more than 10,000 projects. I taught courses having to do with asbestos. I have conducted a variety of exposure assessments in various types of facilities, petro chemical, railroad yards, light/heavy manufacturing, residences, commercial buildings, fire damage buildings. I've done risk based site closers with regard to environmental work, a variety of abatement projects in Chicago where there are tall buildings. I've managed programs for 17 years, for example, in John Hancock Center.

So there's been a wide variety of projects I've worked on that involve many types of chemical, physical and biological agents.

Q. Some of these are different chemicals and projects are identified here?

A. They are, yes.

Q. Mr. Boelter, have you also published in the peer-reviewed literature?

A. Yes.

Q. In particular with respect to asbestos?

A. Yes, I have.

Q. All right. Have you published in matters not related to asbestos?
A. Yes, I have.
Q. Do you consider yourself someone who just is focused on asbestos during the course of their career?
A. No. It's something I have -- that's been a part of my entire career, and actually preceding my career. So it's something I know quite a bit about, and it's something that I've been working on, but it's not been my focus of my career.
Q. All right. There's three publications that are identified here, these relate to asbestos?
A. Yes. They all relate to asbestos as it relates to gaskets and packing materials.
Q. Okay. Can you tell us a little bit about these. The bottom one is "Asbestos Fiber Exposure Assessment of Dry Asbestos-containing Gaskets and Packing Found in Intact Industrial and Maritime Fittings", published in the AIHA Journal. What is the AIHA?
A. That's the American Industrial Hygiene Association. It is a -- it's the world's largest association focused on occupational health. And in the -- there are somewhere between 15,000 to 20,000 members.
There's a journal, a professional journal published by the AIHA. It has a different name today, but at the time that particular manuscript was published, it was known as the AIH

Journal.

Q. This was published in 2002. This is a gasket study. Is this the one -- or one that you did for Coltec?

A. It is.

Q. All right. Above that is a paper, "Heavy Equipment Maintenance Exposure Assessment Using a Time Activity Model to Estimate Surrogate Values for Replacement of Missing Data." Can you tell us what this paper was about?

A. Yes. This was a study of a series of equipment maintenance projects that was funded ultimately -- was funded by caterpillar.

And the issue that we focused on with this particular manuscript was, when looking at developing eight hour time weighted average data, for example, and there are missing pieces of data, either because of a sensor data point such as a less than value, or that in fact a data point doesn't exist or to overload sample, how can that be addressed to generate values for exposure.

Q. The top paper is, "Exposure Data From Multi-application, Multi-industry Maintenance of Surfaces and Joints Sealed with Asbestos-Containing Gaskets and Packing", published in the *Journal of Occupational and Environmental Hygiene* in March of 2011; is that correct?

A. Yes.

Q. Can you tell us what is the *Journal of Occupational and*

*Environmental Hygiene*?
A. That is the -- that is the current name of the journal that used to be known as the AIHA Journal.
Q. Okay. And what was this paper about?
A. Over the years I have done about 30 or so different studies related to gaskets and packings, and some are field studies, some are chamber studies, some are simulations, some are actual workplace, some are wet gaskets, some are dry gaskets. So this is a compilation of all of the data points from a variety of studies that were conducted in different settings.
Q. Does it include the Coltec study?
A. It does.
Q. And does it also include studies for other companies that are in asbestos personal litigation?
A. Yes.
Q. I wanted to just touch on this. You mentioned a term earlier in one of answers, "exposure assessment". Can you tell us what an exposure assessment is?
A. Sure. When thinking about the process, ultimately, of trying to determine whether or not being exposed to something creates risk, the process is often referred to as a four-step paradigm, a hazard assessment, an exposure assessment, a toxicologic assessment, and a risk characterization.
So an exposure assessment is a critical part of being

able to estimate and judge the significance of risk involving hazards. Hazards and risks are not the same thing.

So an exposure assessment is a process of understanding what people do, frequency, duration, time, activities. And ultimately being able to evaluate in a reliable and reproducible way, what brings on concentrations or dermal contact or ingestion they might receive from various routes of entry.

Q. When you were working for OSHA as a compliance officer, did you conduct exposure assessments?

A. Yes. According to what was then known as the IHFOM, the Industrial Hygiene Field Operations Manual.

Q. When we looked at your publications, are these exposure assessments?

A. Right. These are all exposure assessments.

Q. And exposure assessments that relate to asbestos gaskets and/or packing; is that correct?

A. Yes. They have relevance to other contaminants of interest. But these were focused on asbestos.

Q. Have you done other -- let me ask this way. Are any of your other publications that have appeared in the peer-reviewed literature related to exposure assessments?

A. Yes.

Q. Approximately how many other peer-reviewed papers relate to exposure assessments, if you know off the top of your head?

A. I think I published about 10 or 12 different, either chapters of journal books or in literature such as these.
Q. What about conferences. Do you speak at conferences?
A. I do, yes.
Q. Have you -- the AIHA, for example, has a conference every year; is that correct?
A. Yes. They actually have two conferences. One is what's called the spring conference, and the other is the fall conference. They're a little bit different.

The spring conference is a large conference, 7-, 10,000 people. The fall conference is a smaller conference, 400 people that is sponsored by what's known as the academy. Where if you're a certified industrial hygienist you can belong to the academy. But they are both AIHA related conferences.

Q. Have you taught courses on exposure assessments in both those conferences?
A. Yes I have.
Q. There's also the British Occupational Health Society; is that correct?
A. That's correct.
Q. They have conferences every year, have you presented there?
A. I have.
Q. Have you taught courses on exposure assessment?

A. I have, yes.
Q. So we have a slide here of identifying at least a couple of awards that you've received. AIHA Award for Best Qualitative Risk Assessment?
A. Yes.
Q. That's a different term than exposure assessment, isn't it?
A. It is a different term. This involves the use of an exposure assessment in characterizing risk and assessing risk.
Q. All right. And then the Edward Baier Award for Combining the Sciences of Retrospective Exposure Assessment into Risk Characterization. What did that recognize?
A. That's an award that's been given annually for about 25 years, I think. The purpose of the Edward J. Baier Award is a significant contribution, technically, to the profession.
Q. Okay. The Retrospective Exposure Assessment is a term that is used in that award. What is retrospective exposure assessment?
A. Well, probably the way to think about it is, for example, a number of the investigations that I've done in my career have involved fatalities, and a number of them have been related to either confined space entry or a suspicion that someone may have been asphyxiated by nitrogen, for example.
And thus there's a methodology to look backwards in time to determine events that occurred, and whether or not there

were exposures that occurred, and whether those exposure were significant enough to be related to the claimed injury or the claimed disease.

So a retrospective exposure assessment methodology is similar to a prospective one where you're looking into the future, or as an industrial hygienist where I'm in a facility today, evaluating the conditions that exist today, and trying to determine whether those are representative of conditions tomorrow and into the future and conditions into the past.

Q. We contacted you last year, or engaged you last year to work on a project for us. Can you tell us what that was?

A. Yes. The question that I was asked is how to evaluate exposures to pipefitters, as a result of their removing insulation to gain access to a flange. That's fundamentally what the question was that I was asked.

Q. Okay. How do you know how to do something like this?

A. Well I have a long history of doing field work, working with various trades. My father was a plumbing and heating contractor. I grew up with the trades. I know what a pipefitter is. I know what a plumber is. I know different tools and techniques are used. I've seen this work done. I've done this work myself. And I've evaluated as a professional, many different settings where trades people are performing the work.

Q. You have, as part of your private consulting work you

have testified in the past for Garlock and for some other companies; is that correct?

A. That's correct.

Q. You have -- have you ever testified at the request of plaintiffs?

A. I have, yes.

Q. In the course of that work have you also reviewed depositions by pipefitters in the asbestos personal injury litigation?

A. Yes I have.

Q. Did those inform your opinion as to understanding the type of work and work practices that they engaged in historically?

A. Yes. It's what they said they did historically, yes.

Q. Okay. Had a study like this been done before?

A. I was not aware of one, no.

Q. What's unique about this? We've seen studies by insulation exposures previously that Mr. Liukonen discussed. What's unique about this type of project as opposed to what you've seen within the literature?

A. Well, there's several things that we tried to undertake with this study. One is it was focused on pipefitters, and people that are not insulators, needing to gain access to what's underneath the insulation to perform their work.

The other is when looking at the literature, what is

often referred to as data quality is of interest. Can we interpret the historic literature, and how do we apply it to answer questions that are being asked today.

So this was a study that undertook the specific interest of removing insulation to gain access for some other reason, but also to address data quality gaps that existed in the literature.

Q. What are these pictures that we see here?

A. These are -- when designing an exposure assessment, in this particular study the point was there's insulation that's in place and it needs to be removed.

So understanding how insulation's put on; understanding the characteristics of the insulation; understanding the applications. In the upper left hand photo that's a photo I took in a refinery, and it's a complicated piping system, and there's insulation that's involved.

And the objective, ultimately, of the pipefitter in a scenario of needing to gain access to a flange, is to get to the gasket which is what's shown in the lower photograph.

Q. Okay. How did you know specifically, if you can be more specific, how do you know what a pipefitter does?

A. Well, what I had evaluated pipefitters in various situations. These are all photographs that I took of a pipefitter. A pipefitter by definition is a person who is a tradesperson who lays out, assembles, fabricates, maintains,

and repairs mechanical piping systems. That's the definition of a pipefitter.

So what you can see is, these are pipefitters. Some of them are wearing sampling equipment because I'm evaluating their exposure during tasks and activities. They do many different things that are not necessarily all gasket related. They lay out pipe. They weld pipe. They cut pipe. They'll break pipe. They'll disassemble, they'll reassemble, they'll clean. There's a wide variety of tasks and activities that a pipefitter does.

Q. These are photographs that you've taken?

A. Yes, I took all of these.

Q. Are these from projects that you've worked on in the past?

A. Yes, they are.

Q. Are they all -- or were studies that you've done for defendants or companies that are involved in litigation?

A. No. Not all of them, no.

Q. Okay. I would like to ask you more about how you went about doing this. Did you do this study in the field, or was this done in a chamber?

A. The exposure assessment?

Q. Yes.

A. That was done in the chamber.

Q. Why would you do this in a chamber, not go out into the

field and do it?
A. Well, there's a number of reasons for it, not the least of which is looking at the historic literature and my own testing and evaluations of different building materials over the years. The anticipated concentrations would be in excess of today's allowable limit. So there would not be a way to perform that work in the field and be compliant with the OSHA rules. It would be considered an abatement job which would have to be done wet, and that's contrary to the planning.

So what we wanted to do was to conduct the work, build in the design and install a system that would allow us to conduct the work the way it used to be conducted back in '60s and '70s.

Q. All right. You have some photographs about how you went about doing that?
A. I do.

MR. HARRIS: Your Honor, could Mr. Boelter step down.

THE COURT: Sure.

MR. HARRIS: I think it may be easier for him to identify these for us.

Mr. Boelter, you may need that microphone.

Q. So Mr. Boelter, how did you go about designing your study?
A. What we -- what a hygienist does in designing and

developing a sample strategy and exploring an assessment strategy is to understand what people do. So I go into the field, I watch people, I talk with them. I observe their tasks and activities. I figure out what their time in motion is, and then I will select people to be sampled if I'm doing a field study.

If I'm going to be doing a chamber study, I want to replicate that time and motion in the chamber, and be faithful to what people actually do in the field.

Q. All right. In terms of -- I see in the upper right-hand corner there's a reference to a quasi field study. Can you tell us about that? Does that relate to a study you've done?

A. It is. Actually that's me on the right with walking away. I took all of these photographs. These are different types of settings where studies could be done. The upper left is a field study. You take the conditions as they exist. These are real people doing real things in real workplaces.

The quasi field study in the upper right is actually a workplace. This happens to be a railroad locomotive engine shop. I can't bring a railroad locomotive to my test chamber, so I have to go to this shop. It is in fact a workshop, except we did not want other activities being performed in the shop, except what we were interested in doing. So that's why I called it a quasi-field study.

The quasi-chamber study in the lower left, this is the

caterpillar study and the equipment that we were testing. And in the foreground is one of the mechanics that was doing the work. This was their shop where they were doing their work. It was the only activity that was being performed in the shop, and thus I called it a quasi-chamber study, because it was a controlled environment.

The chamber study in the lower right is our testing facility in Niles, Illinois. And here we're doing an evaluation, engine mechanics working on a car inside of the chamber. This is a controlled environment. It's unventilated. It's cleaned before we start. So they represent different opportunities for capturing different types of information.

Q. Well, for this pipefitter exposure assessment, how did you choose -- what type of system or how did you go about deciding what to emulate?

A. Well our interest was to find a system that we could replicate that would have a -- tasks that were of interest, namely, the removal of insulation of a piping system to gain access for the purpose of removing gaskets. That was the focus of the study.

What I did was, I talked with a mechanical piping company that I knew, and told them what I was interested in. They took me around to various sites that they were operating in. And this happens to be, in the lower left, a mechanical room

in a hospital where they were in fact in the process of changing out belts. That's what they were doing.

So this is a steam system coming in, going into a heat exchanger. And then there is circulating return water and outgoing water. So it was a system that existed.

In fact, these pipefitters were changing out valves, because the valves had seized. In the process they have to remove insulation, take apart the valves, reassemble them. So this is exactly what I was looking for. There happened to be three systems.

So this is a view looking down on top. This is a view looking straight on. And this gives you a sense of scale of some valves and fittings are at floor level, some you have to get on ladders and use devices.

So it seems to me a good example of a system that we could create in the chamber, that is in fact what people do.

Q. And so how did you create it in the chamber?

A. Well we -- I had a couple of architects go out and do field drawings. The pipefitter then built the system according to what existed. We made some adjustments in the size of the pipes, because of the size of the insulation that I had available to me.

But for the most part, the scale of what we used in the facility is identical to what was in the field.

Q. So you had materials. Is that -- well that's what I was

going to ask you. Where did you get asbestos pipe covering materials in order to insulate the system?

A. I've actually been harvesting different types of materials from abatement projects over the years that were different from one another.

These are photographs that I took of a -- some of the materials that we used in the system that I harvested. This is how they were installed. There was a chrysotile/amosite/crocidolite material, an amosite/chrysotile material, which is these materials here. This is fiberglass that wasn't used, and then there was an amosite material as well, as well as an asbestos finishing cement.

Q. Pipe covering above it in the upper left-hand corner is identified as chrysotile/amosite/crocidolite?

A. Right.

Q. Could you tell us was it a blend -- first of all, how do you know what the constituent material was?

A. As a building inspector on these projects we were doing surveys to find out where the asbestos-containing materials were in the buildings. So the analysis came up on the field survey, which then I was informed about. I went out and verified that in fact this was.

During the abatement process, we have the abatement contractors carefully remove the sections without damaging them and perform that work dry so I could harvest them. That

was done in all these settings.
Q. So the pipe covering actually contained all three fiber types?
A. It did.
Q. Do you have the percentages or do you know the percentages?
A. Not off the top of my head. I think it's in my report.
Q. But it's identified in your report?
A. Yes.
Q. Then it looks like the other -- in the upper right-hand corner is pipe covering that is a blend of amosite and chrysotile?
A. That's right.
Q. The bottom is just amosite; is that right?
A. It's just amosite.
Q. And the cement, what was the fiber type in the cement?
A. It was a chrysotile cement, finishing cement.
Q. You used these materials in your study?
A. Yes.
Q. You mentioned that you had this mockup drawn and then configured in your chamber. Does this slide reflect that?
A. Yes. On the left is the drawing of the setup of the chamber. It was a chamber within a chamber. What we -- because we were using supplied air respiratory protection, we would be pressurizing the inner chamber, and we needed to

contain that so it wasn't leaking out. So we built a chamber around the chamber and HEPA exhaust, H-E-P-A exhausted that.

This is the pipefitter building the system seen in the hospital. This is the system when it is finished but before it's insulated. Then that's inside of the chamber before the skin is put on the chamber.

Q. So this is a mockup of a heat exchanger system in a hospital; is that right?

A. That's right.

Q. It's a commercial setting or industrial setting?

A. It would be called a commercial setting.

Q. All right. We have heard about the insulation used in the Navy. You've been on Navy ships?

A. Yes. I took this picture, actually.

Q. All right. This is from the USS Lexington; is that right?

A. That's correct.

Q. So it shows pipes that are insulated. You're familiar with the practices of how the pipes were insulated historically?

A. Yes.

Q. Does your study have any relevance to what the exposures might be on board a Navy ship as opposed to in a commercial setting?

A. I think they're comparable. The materials are very

similar to one another. The tools and techniques are very similar. The practices of rip outs, for example, are what are performed on the ships. So I think that the data is comparable, certainly.

Q. All right. You have old insulation materials, but you're not an insulator, right?

A. That is correct.

Q. You weren't an insulator certainly back in the 1960s?

A. No.

Q. How do you know that -- or how did you go about trying to make sure that your system was insulated, like systems that have been insulated historically?

A. My approach as a hygienist is -- first of all, I don't want to tell anybody what to do. I'm interested in understanding what they do.

So we interviewed several insulators that were retired, and talked to them about what we were doing, and what we're interested in doing, and asked them how they went about doing insulation historically. They told us about the methods. The told us about the tools. They told us about the materials. And that was consistent with what I knew about what the Navy training video. I then showed the Navy training video to the insulators. They said, yeah. That's exactly what we did and that's exactly how we did it back in the day.

Q. All right. And is this an excerpt of the Navy training

video?
A. Yes, it is.
(Video playing.)
THE WITNESS: So in this Navy training video they talk about how to insulate a flange with a hard material. You take a board, and you cut it and you then score it. And what we have is the Navy training video on the left, and on the right are the insulators while they were using the old insulation that I harvested, to insulate the system that was built by the pipefitter.
So the saw is being used to score the material. The material is then flattened, and there is a -- in the case of a -- the Navy video, think of it as a rubber strap. It is wrapped around the flange to then allow for the insulator to slide sections of the insulation underneath the rubber strap. The rubber will hold it in place until the entire flange has been surrounded by the insulation.
On the right you see the insulator using the same technique. He has basically a rubber strap wrapped around the flange, and he's inserting these pieces of block underneath the rubber strap that holds it in place.
Once the rubber is -- once the flange is completely surrounded, then they take a wire strap and strap the pieces in place permanently. Using insulating cement, provide a base coat, and then ultimately a finishing cement over the top to

create a finished and fully insulated system.

What we're seeing here is the --

Q. Oops -- sorry.

A. Okay. We can see it here.

What we would have seen in the previous was the insulation has been applied. And then it's finished by putting a cotton cloth over the top that's held in place with a wheat paste.

Q. All right. We have a photo of the whole system as you mocked it up, it's been insulated and painted; is that correct?

A. Right. This is the system as it's ready to be used in the testing. And this is the system that was emulated in the hospital.

Q. All right. Now Mr. Boelter, is this all asbestos insulation that we're looking at here?

A. No. First of all I didn't have enough asbestos insulation. But what I had was a sufficient amount to insulate with asbestos, those sections that the pipefitter said.

When we would have to remove insulation, the amount that we would remove is probably 3 or 4 inches to either side of the flange, and then the material around.

So the valves what I call the collar on the pipe are about 3 to 4 inches to the side of the flange, plus the body

of the valve are insulated with asbestos.

If it's part of the system, for example, to the right of the collar and around the elbow, I wasn't planning on removing any of the material. That's a modern type of non-asbestos-containing material.

Q. So the asbestos pipe covering only extends 3 inches on either side of the valve; is that correct?

A. That's correct.

Q. Then the valve is covered in asbestos insulation, the pipe covering that we saw in the cement; is that correct?

A. That's correct.

Q. All right. Now this was old pipe covering that you were putting on in the Navy training video, or historic training video looked like they were going to use the new pipe coverings. Will that be in better shape than the old pipe covering you were putting on?

A. I think that the description that was given to me by the insulators was that they had to be careful in handling the old pipe covering that I was asking them to insulate this system with, because it was dried out and it was crumbling.

What I asked the insulator is, I understand that, but is this the condition you would expect a pipefitter to find if they were having to remove the insulation in the past? They said, absolutely.

Q. You were not collecting your air samples on the

fabrication and the installation of the materials; is that correct?

A. That's correct.

Q. It's only for removing the insulation or to access the flange; is that correct?

A. That's correct, yes.

Q. Now this is -- let me go back a slide.

This is labeled "Pretest Validation", and I see there's some filters hanging around the pipe. Can you tell us what this was about?

A. Sure. Again, we anticipated elevated concentrations during our sampling. And one of the challenges is the modern methods that we use today for evaluating asbestos exposures, were never designed in anticipation of the types of concentrations we were expected to evaluate here.

So our challenge was determining what size filter; what size -- what length of flow rate; what duration of sample. We didn't really know what would give us the best combination of readable cassettes.

So our pretest was designed to give us a variety of flow rates, durations and filter sizes to allow us to decide the best combination for our actual test.

Q. First of all, let's start with the picture in the upper left-hand corner. What does that picture represent?

A. That's infrared imaging of the system. It turned out one

of the biggest challenges on this project was drying it out, because the insulation went on wet and it took a long time to dry it out so that we could actually use the system in our testing. So we're taking infrared imaging to tell us when the system is actually dry.

Q. Well, in the field though, does it take insulation a real long time to dry?

A. Well, there's a couple of things to remember. One is, it probably is there for a while. And the second is, the systems are operating, and therefore if it's a heated system, it will be drying from the inside out.

Q. Your system was just a mockup. It wasn't an actual real operating steam or heat exchanger system?

A. That's correct. It was -- it did not have any process fluids moving through the piping. But we had different ways that we were trying to dry the system out from the inside out and from the outside in. But it took some time.

Q. Now what did you mean that the air -- the methods were used for measuring or assessing exposures today are maybe too sensitive to measure exposures from historic insulation?

A. Sure. In the '40s and '50s and '60s, the predominant methodology was an impinger, where the results are reported in millions of particles per cubic foot.

In the mid 1960s a filter technique was developed, it's called mixed cellulose ester or MCE. And that filter became

the standard during the 1970s when I was an OSHA compliance officer using a filter cassette that is this larger hole. And its diameter is 37-millimeters.

As the OSHA allowable limit became lower and lower, there was a need to develop a method that would be more sensitive at lower concentrations, and NIOSH developed a method known as 7400, which still uses an MC filter, still uses light microscopy for the analytical technique, but it's a smaller filter. It's a 25-millimeter cassette, which is a smaller hole, and is able to resolve at a lower concentration.

Q. With Mr. Liukonen's we saw how the OSHA permissible exposure limits and the ACGIH TLVs had come down over the years, correct?

A. Right.

Q. OSHA started out at 5 fibers per cc in '72 and now it's .1; is that right?

A. It actually started at 12 with their ETS, and then it dropped to 5 within a year and then went to 2 in 1976.

Q. So the equipment today is designed to measure those exposures that are above or below .1 fibers per cc?

A. Below .1. The analytical method is able to resolve to point -- 0.01.

Q. The equipment today is designed for measuring small exposures?

A. Right.

Q. Because we don't have the higher exposures anymore?
A. That's correct. It's very unusual to find high exposures today.
Q. What did you determine from your pretest evaluation?
A. We determined that we needed to use 37-millimeter cassettes. We had a limit on the duration of time that we could sample to no longer than five minutes for short term samples, and that our sampling flow rate was at the lower end of the validated range.
Q. Was there a methodology that you used that is approved in the industrial hygiene community?
A. Yes. It's called the OSHA reference method is what we used.
Q. I think we talked about this. Can you tell us what your exposure strategy was then?
A. What our interest was, is to evaluate a pipefitter who is removing insulation. I've seen this done myself. This is a picture I took in the early '80s where I was surveying in a building to identify where asbestos was on different piping systems. And so I was making notes and marking these systems.
I came back the next day to continue on, and at some time overnight somebody had taken a hammer to the insulation I just marked as asbestos, beaten it off and it was laying on the floor.
So that was a practice I have read about in depositions.

It's a practice I've personally seen done. And it's a practice that the pipefitters used to do back in the '60s.

Q. Okay. So what was the practice that you identified or that you evaluated?

A. What we did then is, we were evaluating historic practices. The interest was to gain access to the flange and go through the entire process of changing the gasket using a flange spreader. Doing a complete fitting removal and replacement, or replacing a gasket only associated with a fitting, and then ultimately clean up.

So we had a variety of tasks and activities. They were all focused on the process of gaining access to a fitting for the purposes of replacing a gasket.

Q. Now historically did people wear respiratory protection when they were doing this type of work?

A. No.

Q. What steps did you take to ensure that the people doing this work inside the chamber were protected?

A. We concluded that we needed to do this work with the highest level of respiratory protection, which was a supplied air pressure demand supplied air -- breathing air and supplied to the mask.

Q. Okay. So who all participated -- who was inside the chamber when this work was done?

A. There were four people in the chamber. The pipefitter,

myself as his helper, and then two air sample professionals that are part of my staff.

Q. All right. On the final test date we see that the pipefitter there in the upper left-hand picture?

A. Right. This is the pipefitter, and this is his apprentice, that's me.

Q. All right. It says the pipefitter removed insulation, characterized single events. What does that mean?

A. What we did is, we did the sampling strategy as a series of discrete events. So that when the insulation -- just before the hammer is swung to begin to remove insulation, there is -- both myself and the pipefitter wearing two different pumps. One pump is running continuously with a cassette being changed every 15 minutes. The other pump is run only for the duration when the insulation is being removed, but for a minimum of 15 minutes.

So there's a series of short term samples which are task based. And then there's corresponding long term sampling which is long term based.

Q. Now we heard of long term samples being for eight hours. Were you taking an eight hour sample?

A. It wasn't possible to take an eight hour sample. Based on our pretest, we concluded that the longest that we could collect a sample was for 15 minutes. Therefore over the course of eight hours, the eight hour time weighted average is

a mathematical combination of 32 discrete samples for each individual.

Q. Then you also collected short term samples that were specific to the task?

A. Right.

Q. How long were those samples?

A. Those short term samples couldn't be longer than five minutes, but there were a minimum of three to six. So for 15 minute combination for comparison to a ceiling value, and a series of six, 5 minute samples or a 30 minute sample for comparison to a short term sample.

Q. There's reference there, "characterized time and motion". What does that mean to you as an industrial hygienist?

A. It's important to understand when I was talking with the pipefitters at the hospital, for example, how long does it take you to do this. What are the steps that you need.

So understanding their use of the chain pulls, understanding their use of ladders, understanding the use of tools, understanding how they would manipulate a valve to get out of the system that is stuck, understanding all of that is important.

During our testing it was important for us to capture the information so that when we received results, we could compare the time and activity being performed during the sample result, with the result that we got from the laboratory.

Q. Okay. So it's all set up and you're ready to monitor. Can you tell us what we're seeing here?
A. Right. This is the pipefitter on what we call Valve 6-B. So each valve had a number and each flange had a letter. And the pipefitter and I are trading off and removing the insulation that is on the flange, associated with this particular valve.
So outside of the chamber there is a person who is logging the activity, and that's our time and motion. And this is another valve. This is called Valve 9. And this is the removal of the insulation that's on that valve.
Q. This looks different. Is this insulation different than what the other -- what we saw up in the prior video?
A. It is. This is the only valve that was insulated only with amosite materials. All the other valves had different combinations.
Q. What was the percentage of amosite in this material?
A. Ninety percent. As far as the block material, and then the amosite containing cement, I don't remember the exact number. It was something more like 35 percent.
Q. Is it in your report?
A. It is in my report.
Q. Mr. Boelter, what were the tasks for the day that you were going to be evaluating?
A. The tasks were the removal of the insulation, the removal

of the bolts, the separation of the flange, the removal of the gasket, the -- essentially the cleaning of the flange, and then the replacement, ultimately, of the fitting.

In this particular case we're now lowering the Valve 6 that has been had its insulation removed. And the technique that would be used in the fields, because of the potential for physical injuries, is to use what's called a chain pull. And that chain pull is hanging above on inner struts. Once the valve is freed from between the flanges, the chain pull is used to lower the valve down so that work can be performed on the valve, or the valve itself can be replaced. So the pipefitter is often on ladders and lowering and moving around the equipment.

Q. There is a gasket on the flange. You put gaskets in the flanges?

A. Yes. The system was mocked up the way they would have built it in the field.

Q. Is that an asbestos or non-asbestos gasket?

A. It is a non-asbestos gaskets.

Q. No asbestos gaskets are involved in this project?

A. That's correct. The interest was unrelated to the asbestos gasket.

Q. So we see a valve removal where a valve was pulled out of line to be repaired or rebuilt or replaced. Are sometimes gaskets changed on the lines without pulling the valve?

A. Yes. In which case they would use what's called a flange spreader. Where there's no reason -- this particular flange is leaking, tightening the bolts don't make any difference. It's judged to be of a valve of a size or certain point in the system where they don't want to remove and take apart more than they need to. So they use this device called a flange spreader that is -- once all the bolts are removed from the flange, the flange spreader is put in place. And then a wrench is used to drive a wedge into the gap between the flange, and thus separate the flange to gain sufficient access to remove the gasket.

Q. Why can't you just pull the pipes apart to get in there?

A. They're all woven together, essentially. It's a system that is tight.

Q. Well, now the flange isn't welded?

A. No. No. For example, the pipe on this side, and the pipe on this side are welded in place, and therefore you can't physically pull the flanges apart. They're held in place together.

Q. All right. So what type of analysis of the air samples did you do?

A. Following the OSHA reference method, the samples were analyzed by light microscopy using phase contrast microscopy, following NIOSH 7400.

And when you're looking -- that's -- this is the light

microscope. When looking through the scope, you see this through the eyepieces. And this circle is called a field. And around the outside are various size, clear and dark references that are a length of 20 microns and a width ratio. We're looking to count according to rules.

And the way to count -- so we're counting these objects that are inside of the field that are longer than 5 microns in length, with a length to a width ratio of 3:1.

Q. Then there's another type of microscopy method -- you don't have to explain in detail, we heard about it through Mr. Liukonen called NIOSH 7402.

A. Right. The light microscope does not tell you what the fiber is, it simply counts fibers that meet certain criteria. The electron microscope tells you what type of fiber it is. You can identify the fiber type and you use that to determine what fraction of the fibers are asbestos.

Q. What other fiber types are in the work environment, even in a work environment like a chamber that are not asbestos?

A. Well, let me put it in the context of this courtroom. If I did sampling in this courtroom and I counted using this method, I would count fibers. Because there are many different types of fibers. They come from paper, they come from our clothes, they come from the carpet, there's many different types of fibers. The method of 7400 doesn't tell you what the fiber is. So you need to use some other type of

analytical tool.

But in the chamber there were few relevant fibers that were anything other than asbestos.

Q. So for each event you collected five minute samples for a minimum of 15 minutes. And then for the duration of the study, the full eight hours you collected 15 minute samples. So you had a lot of data that you collected?

A. Right. We collected 274 samples.

Q. All right. And there are charts, or the information is contained in your report about what the results were in that respect; is that correct?

A. That's correct.

Q. All right.

A. Would you like me to explain this?

Q. Just briefly, please.

A. Yeah. What we did is we captured time and motion activity. That's this top several rows. So across the top, this is a timeline, and then it's based on the activities that we broke into insulation work, gasket work, clean up work, we simply plotted across the page.

Then we laid next to it the task based personal samples, the continuous long term samples, personal, and then the area samples, so we could correlate results with activities.

Q. Now what does the red represent to?

A. The red is an overloaded sample that is -- that was able

to be read, but it falls higher -- it falls outside of the preferred loading on the filter. So it would be reported as biased load.

Q. Is that how you reported it?

A. Yes.

Q. So even all the pretest work that you did, you still had overloaded samples?

A. We did. We had a few of them. We didn't have many, but we had a few.

Q. Okay. So this is a chart of the short term samples that you collected?

A. Right. So what I've done now is to plot on a timeline, the various events over the course of the day. We have a series of discrete events, as well as continuous events. So we have one, two, three, four, five, six, seven discrete events involving access involving valves.

I plotted along the timeline then concentration, with the scale at the top being 400 fibers per cc. And just to give you a reference, today's allowable limit is 4,000 times lower now. Today's allowable limit is basically the black line on the bottom.

Q. Well, today's allowable limit is one fiber per cc for a 30 minute time.

A. I'm sorry. Yes. I was thinking of the -- you're correct.

Q. These are short term samples so it's appropriate to compare it to the one fiber per cc limit?
A. That's correct.
Q. So start with Valve 5 on the right or on the left. That looks like the exposure's in the 70 to 80 fibers per cc?
A. That's right. They range between 50 and 80 fibers per cc.
Q. And is that -- how does that compare with the short term limit?
A. That is -- today's short term limit is one fiber per cc, so that's 80 times higher, 50 to 80 times higher.
Q. All right. We saw that 90 percent amosite pipe covering unibestos (phonetic) type pipe covering that was on a valve. Which valve was that on?
A. That was on Valve 9.
Q. Was that where you found your highest exposures?
A. It is actually.
Q. So your first event, there's no activity that had gone on before that would generate asbestos fibers, and that's in the 50 to 80 range?
A. That's right.
Q. Okay. Then these others -- you weren't cleaning out the chamber every time you were doing -- these were continuous sampling that was done, correct?
A. Right. With the exception of when we took a lunch break

which is around noon.
Q. All right. Now for the 15 minute -- you also -- tell us what this chart represents?
A. Sure. The -- historically in the '70s when I was a compliance officer, the permissible exposure limit was presented as an eight hour time weighted average or as a ceiling concentration C-E-I-L-I-N-G not to be exceeded at any time as measured over a 15-minute interval.

So in our case this was based on three, five minute samples. So what I did was I plotted the ceiling result upon the same scale as I had before, with 400 at the top and zero at the bottom.

So the ceiling doesn't have a comparison to date, because we use a 30 minute short term average. But it can be compared against historical. Back in the '70s the ceiling allowable was 10 fibers per cc.
Q. So on our prior chart you're comparing to a 30 minute short term exposure limit. And then on this chart you're comparing to a ceiling limit from the early 1970s?
A. Correct.
Q. What was the ceiling limit then?
A. 10 fibers per cc.
Q. This is higher than that ceiling limit?
A. All of the samples are higher than any allowable limit at anytime.

Q. Okay. This chart has a red line in it. Can you tell us what that represents?
A. What I've done now is I plotted the 15 minute ceiling values along with the area samples we had collected in the four quadrants over the course of the day we collected area samples. So the red line is the average over four area samples as seen over the course of the day. And they trend very similarly to the personal breathing zone samples which is not unexpected.
Q. What you would expect is that as the activity is going on, the exposures -- the area samples report higher results, and it looks like it did after Valve 9 was done, as well?
A. That's correct.
Q. Can you tell us what this chart represents?
A. What I did was, I was familiar with the literature with regard to insulation, and insulation removal. What I've done now is to plot the information historically that I was familiar with, against my values which are here at the bottom. Partly to just verify that my results fall in the similar pattern which they do. They are very similar to the historic insulation materials.
Q. We've added a 1975 committee expert Beckett. This was a document that Mr. Liukonen talked about and has been admitted into evidence. That's added to this chart as well; is that correct?

A. Yes.
Q. These -- so on these other samples though, were they evaluating the same thing or the same tasks that you were evaluating?
A. Well you really couldn't tell, because there was no information about what trade was performing the work. But it appeared to me that the descriptions of the manuscripts and the discussions were activities of insulators.
So -- but nowhere did I find the description being the activities of a pipefitter.
Q. All right. Now you've also evaluated -- well let me ask you this. Is there anything surprising about the results that you found for the tasks that you evaluated, compared to what's in the published literature?
A. No.
Q. It's right in line, just a shorter period of work; is that correct?
A. That's correct.
Q. Mr. Boelter, you've also evaluated gaskets. You talked about your gasket papers that have been published in the peer-reviewed literature. You evaluated them many times?
A. Yes.
Q. Do you have clips of what that type of work looks like?
A. Yes. What I've done is, I've grabbed six clips that give an example of the range of different types of equipment, and

the activities that are involved. This is what is referred to as Coltec study. This is me on the left. And I am removing the parent gasket from a flange during the cycle that is called flat plate scraping, where a putty knife would be used as the tool to remove the residue from the flange once the gasket is off.

Q. How would you know how to do that?

A. I've seen this done many, many times, and I've done the work myself. This is a 50 percent chrysotile gasket.

This is during a sequence where the objective was to remove the gasket. Which is what I've always seen done is use some type of a scraper to remove the parent gasket. Then the residue is removed by some other technique.

In this particular sequence the technique for removing the residue was the power wire brush.

Q. Do sometimes gaskets come off more easily than that?

A. Sometimes, and sometimes they don't.

This is a field study that I conducted. This is a pipefitter who is removing -- using his tools and techniques to remove the gasket from a boiler system shut off valve. He's -- his tool of preference is a wooden chisel to remove the gasket. It clearly is adhering tightly. Ultimately what he did was to use a sequence of cleaning techniques that he has developed over the years.

So these are all asbestos containing gaskets. This is a

pump head where the tool on the left that you see is a -- what's called a gasket scraper. And those are my hands on the right. I'm the assistant to this mechanic. And the mechanic is removing the gasket that is adhering to the pump head.

Q. What are the results of these studies?

A. These are all published in my 2011 manuscript. They all involve asbestos. And many times there was no quantifiable airborne asbestos associated with the results.

This is a four stage pump. Again, this is a different mechanic that is removing the gaskets. He's using a gasket scraper, along with a hammer to get under the gasket, and to peel off the gasket, as much of the gasket as he can, before he does the finishing on the flange face.

Q. It says PCME there. What is PCME?

A. That stands for phase contrast microscopy equivalent. Which means that you had a quantifiable value by phase contrast that was then subsequently analyzed by electron microscopy. The product of multiplying those two valves together give you a PCME, phase contrast equivalent.

Q. How long does it take to remove gaskets?

A. It depends. In the studies that I did for Coltec, my recollection is one gasket took 20 -- 24, 25 minutes to actually just get the parent gasket off. And in the field I've seen gaskets take days to get off, depending upon the size of the equipment. But it's the process that takes a long

time. It's not necessarily just the gasket work.
Q. Is that the time in motion that you studied in the pipefitter exposure assessment?
A. That's correct.
Q. All right. So this is a -- is this a table from your published paper in 2011?
A. Yes. This compiles all the data points. What's being shown here are the individual studies, the letters. This is what's called a bar and whisker chart.

So the length of the line is the range from the lowest value to the highest value in the dataset for this particular study. And the hatch mark across the line indicates the average of all the data.
Q. And so this is by PCM and by the transmission electron microscopy method as well?
A. That's correct. So these are total fibers. You don't know whether they're asbestos or not. A hygienist would assume that they're asbestos because that's conservative. But if you wanted to know whether they were asbestos or not, you would analyze them by 7402 and determine what fraction are in fact asbestos.

And what we find out is that even in a controlled study in the chamber where the only asbestos containing material that is there and it's a clean chamber, you still do detect fibers of other sorts.

And fiber differentiation becomes very important with gaskets to understand whether or not in fact it's asbestos.
Q. It says 30 minute EL. That's 30 minute exposure limit?
A. Yes.
Q. And so you're comparing the results of your short term samples to the OSHA short term exposure limit?
A. Right. The current allowable short term limit under OSHA is one fiber per cc.
Q. All right. And so, when you're looking at total fibers, it looks like all the results that you have obtained are below the one fiber per cc?
A. That's correct. One of the conclusions in this analysis that's reported in the manuscript is that with 95 percent confidence, whether it is an aggressive tool, dry, wet, there's 95 percent confidence. The 95th percentile in a statistical distribution, the 95th percentile is often what we look at as a hygienist for comparing against allowable limit. We are highly confident we will not exceed today's allowable limit under any circumstances involving any type of gasket.
Q. So you evaluated insulation exposures and you evaluated gasket exposures. Have you compared the results of the gasket exposures to insulation exposures?
A. I have.
Q. Is this a comparison of the short term exposures?
A. It is. This is the 30 minute excursion limit. What

we're looking at is the pipefitter on the left at 83 fibers per cc, against the helper, which is me, at 51 fibers per cc for the first event of the day in a clean chamber, against the data that was presented in the 2011 manuscript.

Q. And the less than signs there indicate that on average the results are below the limit of detection?

A. Right. That's the limit of quantification of method, right.

Q. That's using though the TEM analysis, not your phase contrast microscopy analysis?

A. Well, it could be either. If by the phase contrast count, the value is below the quantifiable limit, you don't do TEM. There's no reason for it.

If you're quantifying fibers and you're interested to know whether they're asbestos or not, you do the 7402.

But what this says is, that when ultimately looking at whether they're asbestos or not, those are not quantifiable values.

Q. All right. This is a comparison of the short term results. Have you also been able to compare the long term results against -- for gasket work versus insulation work?

A. Yes.

Q. Is that what this chart represents?

A. That's what this chart is. These are eight hour time weighted average reading zone concentrations, again, for this

wide variety of studies. And for the first series of studies are the Coltec study.

So this dataset here is the Coltec dataset, which I did not at the time undertake to determine whether those were asbestos fibers. Therefore, for the Coltec study, there's no fiber differentiation. I just assumed that they were asbestos but I have no proof of that.

However, with these other studies which look very similar to the Coltec data in terms of total fibers, I did do fiber differentiation, and more often than not the fibers we're detecting are not asbestos.

And I would assume that if I had conducted 7402 on the Coltec study, I would have had non-quantifiable values as well.

Q. This is information that you reported in the peer-reviewed literature in 2011?

A. That is correct.

Q. How does that eight hour long term data of insulation exposures compare to the gasket exposures?

A. Right. In our eight hour time weighted average insulation exposure assessment, the pipefitter and the helper both had the same eight hour time weighted average of 86 fibers per cc.

In the gasket related work, those are non-quantifiable values and less than .007.

MR. HARRIS: Your Honor, would this be a good time for our lunch break.

THE COURT: Are you through?

MR. HARRIS: No. Do you want me to continue?

THE COURT: How much more do you have?

MR. HARRIS: I fear it could go 20 to 25 minutes.

THE COURT: All right. Let's take a break. Just come back at 2:00.

(Lunch recess at 12:44 p.m.)